## المرشد العلاجي للإنتان البولي عند الاطفال

| العمر | الأكثر شيوعاً | متوسط الشيوع | الأقل شيوعاً |
|---|---|---|---|
| أقل من عمر ٣ اشهر | ١- حمى<br>٢ - اقياء<br>٣ – وسن<br>٤ – هياج | ١ – نقص تغذية ( إرضاع )<br>٢ – فشل نمو | الم بطني<br>يرقان<br>بيلة دموية |
| أكثر من عمر ٣ اشهر والأطفال Pre verbal | حمى | ١ – الم بطني<br>٢ – الم خاصرة<br>٣ – اقياء<br>٤ – نقص شهية | ١ – وسن<br>٢ – تهيج<br>٣ – بيلة دموية<br>٤ – فشل نمو |
| Verbal | ١ – تكرر البيلات<br>٢ – عسرة تبول | ١ – سوء وظيفة افراغية<br>٢ – تغير<br>٣ – الم بطني<br>٤ – الم خاصرة | ١ – حمى<br>٢ – توعك<br>٣ – اقياء<br>٤ – بيلة دموية<br>٥ – بول عكر |

### عوامل الخطورة لألتهاب الحويضة والكلية

١ – قلة البول عند الذكور

٢ – تاريخ من التهاب الحويضة والكلية المتكرر

٣ – ترفع حروري متكرر دون التهاب واضح في عضو معين

٤ – تشخيص مرض كلوي او طرق بولية غير طبيعية

٥ – امساك

٦ – سوء وظيفة افراغية

٧ – توسع المثانة

٨ – كتلة بطنية

٩ – اصابة النخاع الشوكي

١٠ – فشل نمو

١١ – ارتفاع توتر شرياني

### الاستقصاءات :

- تحري الشريط بعينة بول طازجة للكريات البيض والنتريت :
  - كل الأطفال العرضيين
  - كل حمى غير مفسرة أكثر من ٣٨ درجة
  - طفل يعالج لانتا ن محدد دون تحسن
- زرع البول :

١ – إذا كان العمر أكثر من ٣ سنوات

٢ – نتيجة إيجابية مفردة لتحري الكريات البيض او النتريت

٣ – التهاب حويضة وكلية متكرر

٤ – العدوى التي لا تستجيب للعلاج خلال ٢٤ – ٤٨ ساعة

٥ – عدم توافق العلامات السريرية مع نتيجة تحري الشريط

٦ – التاهب الحويضة والكلية

- إذا كان الطفل غير جيد ( سحنة سمية ) يجب قياس شوارد المصل وأخذ عينة دم للزرع

## جمع العينات :

يجمع البول قبل البدء بالصادات ما لم يكن انتان الدم شديد ( كالتهاب السحايا بالسحائيات)

- جمع البول العقيم بعبوات عقيمة موصى به بعدة طرق :

- في الأطفال الصغار تحت السنتين بالقثطرة للسهولة
- جمع عينة منتصف التبويل في الأطفال الأكبر سناً كاف
- في الأنتان الشديد نأخذ عينة بول للفحص عبر القثطرة

## تفسير نتائج العينات:

دوماً خذ بالحسبان العلامات السريرية

- الأطفال أكبر او يساوي ٣ سنوات نستخدم الشريط لتحديد الإصابة بالـ UTI

١ – استيراز الكريات البيض ( + ) والنتريت ( + ) نبدأ بالصادات لعلاج الـ UTI

٢ – الأستيراز سلبي والنتريت ( + ) ابدأ بالعلاج بالصادات وإذا كانت عينة البول طازجة ارسل عينة للزرع

٣ – الأستيراز ( +) والنتريت ( - ) ابدأ بالصادات فقط إذا كان هناك دليل سريري لـ UTI وارسل عينة للزرع

٤ – الأستيراز والنتريت ( - ) لا ترسل عينة للزرع إلا الموصى بها باستطبابات الزرع ولا تبدأ بالعلاج

## الدراسة المخبرية لعينة طازجة :

١ – العمر أقل من ٣ سنوات مع حمى

٢ – العمر أكبر من ٣ سنوات مع حمى مع : 1 اعراض انتان بولي ٢ – تاريخ التهاب حويضة وكلية متكرر – ٣ – مرض حاد – ٤ – الأستيراز او النتريت ( + ) بالفحص

- *طرق مفيدة في التأكيد الإصابة الحادة :*

- نؤكد الاصابة بالانتان البولي حسب نتائج تحليل البول بحال :

☒ بكتريا + كريات بيض

☒ بكتريا فقط ( UTI) في حال وجود اعراض لكن ممكن أن يكون تلوث ،

☒ بيض فقط عالج في حال وجود أعراض

☒ لا يوجد بكتريا او بيض ليس UTIفي حال الزرع سلبي أيضاً

☒ لبيلة القيحية : الطبيعي تعداد أقل من ١٠ كريات بالساحة

التهاب الفرج – التهاب المهبل – التهاب الحشفة – نلاحظ أيضاً تعداد عالي

الفيروسات ( الإيكو فايروس – والأدينو فايروس / CMV / ممكن أن تسبب بيلة قيحية عقيمة

- ✓ تعداد المستعمرة : أكثر من ١٠*٥ لنوع واحد من الجراثيم تؤكد الإصابة في العينات التي تم جمعها وتخزينها في منتصف التبويل
- ✓ الموثوقية تنخفض حتى ٨٠% مع جمع البول السئ
- ✓ التعداد المنخفض لا يستبعد الانتان

المعالجة الفورية :

- إذا كان الطفل غير جيد سريريا لا تتأخر بالمعالجة خلال المحاولة للحصول على عينة بول
- يجب التأكد من الإماهة الجيدة بسوائل الصيانة
- نبدأ بالصادات التجريبية
- في حال التهاب الحويضة والكلية :
- حالة عامة سيئة ( حمى أكثر من ٣٨ ) والم بالخاصرة نتبع المرشد العلاجي للصادات
- في حال التهاب المثانة: نتبع المرشد العلاجي للصادات

الأستقصاءات اللاحقة :

التصوير يعتمد على العمر ونوع الإصابة

- التهاب حويضة وكلية بسيط يستجيب على العلاج خلال ٤٨ ساعة
- الألتهاب اللانمذجي : ١ طفل مريض١ جداً ، ٢ شح بول ، ٣ – كتلة بطنيةة أو مثانية ، ٤ – ارتفاع الكرياتينين ، ٥ – تسمم الدم ، ٦ – عدم الأستجابة للعلاج خلال ٤٨ ساعة ، ٧ – إصابة بعضويات غير E-COLI

❖ الألتهاب المتكرر

- مرتين أو أكثر من الأنتان البولي مع التهاب حويضة وكلية حاد
- مرة أو أكثر من انتان علوي قيحي
- انتان بولي مع التهاب مثانة ( انتان سفلي ) مرة أو أكثر
- مرات أو أكثر من الأنتان مع التهاب مثانة ( انتان سفلي )

| الأستقصاءات | العمر | نموذجي ( بسيط ) | لا نموذجي | المتكرر |
|---|---|---|---|---|
| ايكو في الإصابة الحادة | من ١ – ٦ أشهر | لا | نعم | نعم |

| | | | | |
|---|---|---|---|---|
| الإيكو خلال ٦ أسابيع من الإصابة | من ١ – ٦ أشهر | نعم | لا | لا |
| DMSA | من ١ – ٦ أشهر | لا | نعم | نعم |
| MCUG( VCU) | من ١ – ٦ أشهر | لا | لنعم | نعم |
| ايكو في الإصابة الحادة | من ٦ أشهر – ٣ سنوات | لا | نعم | لا |
| الإيكو خلال ٦ أسابيع من الإصابة | من ٦ أشهر – ٣ سنوات | لا | لا | نعم |
| DMSA | من ٦ أشهر – ٣ سنوات | لا | نعم | نعم |
| MCUG( VCU) | من ٦ أشهر – ٣ سنوات | لا | لا | لا |
| ايكو في الإصابة الحادة | أكثر من ٣ سنوات | لا | نعم | لا |
| الإيكو خلال ٦ أسابيع من الإصابة | أكثر من ٣ سنوات | لا | لا | نعم |
| DMSA | أكثر من ٣ سنوات | لا | لا | نعم |
| MCUG( VCU) | أكثر من ٣ سنوات | لا | لا | لا |

- ❖ يجرى DMSA بعد ٤-٦ أشهر من الإصابة ووبحال حصول شك انتان بولي عند الطفل خلال انتظار موعد ال DMSA SCAN يجرى تقديم موعد الاستقصاء ( غير متوفر حاليا)

- ❖ MCUGيجرى بعد الشفاء من الانتان
  - يطلب أيضاً عندما يكون هناك مشكلة أو شذوذ بالمسح يتطلب المزيد من الاستقصاءات
  - عند إجراءه يتطلب ٣ أيام من الصادات الوقائية
  - عادةً النتروفورانتئين لعمر أكبر أو يساوي ٣ أشهر بجرعة ١ ملغ / كغ ( القصوى ١٠٠ ملغ )
  - يتجنب النتروفورانتئين في الفوال والقصور الكلوي
  - أو سيفالكسين لعمر أقل من ٣ أشهر جرعة ١٢.٥ ملغ / كغ في ليلا وحسب نتائج الزرع السابقة ويجرى تحليل بول بعد اجراء الMCUG
  - بحال اجراء الـ MCUG عند الولدان يعطى الجنتامايسين الوريدي بجرعة ٥ ملغ / كغ قبل الاستقصاء بـ ٥ دقائق ويتجنب ال MCUG عندهم بحالة الانتان البولي الحاد

***<u>التخريج والمتابعة</u>***

١- : ١- أعراض معتدلات أو أعراض حادة تحت السيطرة

٢- أخذ صادات فموية مع تحمل جيد لها

٣- الشرح للمرضى ومناقشتهم حول عوامل الخطورة وتجنبها ( وهي الإمساك – سوء نظافة العجان – قلة شرب السوائل - سوء إفراغ المثانة )

- إعادة تحليل البول غير مطلوب في الطفل غير العرضي

- العلاج الفوري للتكرار بالكوأموكسيكلاف تفقد الحساسية في زرع سابق
- اعادة متابعة المريض الخارجي
  - يتم قياس الضغط
  - يتابع كل ١٠ - ٨ أسابيع عندما يكون الايكو مستطبا
  - ليس مطلوب في الالتهاب البسيط

***الصادات الوقائية :***

ليست مطلوبة في الانتان البسيط الذي يحدث للمرة الاولى

مطلوبة لـ : ١- الجذر المثاني درجة ٣ حتى يتم استمساك البول نهارا مع سيطرة جيدة على الانتان المثبت

٢- انسداد الطرق البولية الذي ينتظر الجراحة

٣- أي طفل مع تكرر الإصابة العرضية ( أكثر من ٣ مرات ) من UTI خلال سنة

العمر أكثر من ٣ أشهر: تريميتوبريم أو نتروفورنتوئين للوقاية

***المعالجة الجراحية :***

الجراحة للجذر ليست إجراء روتيني VUR

الرجوع للجراحة للحالب المسدود مع جذر

الجراحة عند الفشل في السيطرة على الانتان مع الوقاية في الجذر درجة ٣

كل مرضى المثانة العصبية

الختان قد يكون علاج لالتهاب الحويضة والكلية المتكرر عند الذكور مع طرق بولية غير صحيحة

***المعالجة للأطفال مع ندوب كلوية :***

- لاتستطب المتابعة للعيب الصغير أحادي الجانب مالم يكن هناك التهاب حويضة وكلية متكررأو قصة عائلية إيجابية أو عوامل خطورة لارتفاع ضغط
- في حالات الندب الهامة
  - قياس الضغط السنوي
- في حالة الندوب ثنائية الجانب
  - قياس الضغط السنوي
  - تقييم البروتين البولي ووظائف الكلية كل ٣-٤ سنوات
  - المتابعة على المدى الطويل للمرض الكلوي
  - تحويل الى طبيب الكلية بعمر معين

NICE National Institute for Health and Care Excellence

NICE guideline

# Urinary tract infection in under 16s: diagnosis and management

Clinical guideline

Published: 22 August 2007
www.nice.org.uk/guidance/cg54

# Your responsibility

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

# Contents

This guideline is the basis of QS36.

This guideline should be read in conjunction with NG109, NG112, NG111 and NG143.

# Overview

This guideline covers diagnosing and managing first or recurrent upper or lower urinary tract infections in infants, children and young people. It aims to achieve more consistent clinical practice, based on accurate diagnosis and effective management.

# Who is it for?

- Healthcare professionals
- Commissioners
- Infants and children from birth up to the age of 16 years with urinary tract infection, their families and carers

# Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

## 1.1 Diagnosis

### 1.1.1 Symptoms and signs

1.1.1.1 Infants and children presenting with unexplained fever of 38°C or higher should have a urine sample tested within 24 hours. [2007]

1.1.1.2 Infants and children with an alternative site of infection should not have a urine sample tested. When infants and children with an alternative site of infection remain unwell, urine testing should be considered after 24 hours at the latest. [2007]

1.1.1.3 Infants and children with symptoms and signs suggestive of urinary tract infection (UTI) should have a urine sample tested for infection. Table 1 is a guide to the symptoms and signs that infants and children present with. [2007]

### Table 1 Presenting symptoms and signs in infants and children with UTI

| Age group | Symptoms and signs<br>Most common ----------> Least common |
|---|---|

| | | | | |
|---|---|---|---|---|
| Infants younger than 3 months | | Fever<br>Vomiting<br>Lethargy<br>Irritability | Poor feeding<br>Failure to thrive | Abdominal pain<br>Jaundice<br>Haematuria<br>Offensive urine |
| Infants and children, 3 months or older | Preverbal | Fever | Abdominal pain<br>Loin tenderness<br>Vomiting<br>Poor feeding | Lethargy<br>Irritability<br>Haematuria<br>Offensive urine<br>Failure to thrive |
| | Verbal | Frequency<br>Dysuria | Dysfunctional voiding<br>Changes to continence<br>Abdominal pain<br>Loin tenderness | Fever<br>Malaise<br>Vomiting<br>Haematuria<br>Offensive urine<br>Cloudy urine |

## 1.1.2 Assessment of risk of serious illness

1.1.2.1 The illness level in infants and children should be assessed in accordance with recommendations in the NICE guideline on fever in in under 5s. [2007]

## 1.1.3 Urine collection

1.1.3.1 A clean catch urine sample is the recommended method for urine collection. If a clean catch urine sample is unobtainable:

- Other non-invasive methods such as urine collection pads should be used. It is important to follow the manufacturer's instructions when using urine collection pads. Cotton wool balls, gauze and sanitary towels should not be used to collect urine in infants and children.

- When it is not possible or practical to collect urine by non-invasive methods, catheter samples or suprapubic aspiration (SPA) should be used.
- Before SPA is attempted, ultrasound guidance should be used to demonstrate the presence of urine in the bladder. [2007]

1.1.3.2 In an infant or child with a high risk of serious illness it is highly preferable that a urine sample is obtained; however, treatment should not be delayed if a urine sample is unobtainable. [2007]

## 1.1.4 Urine preservation

1.1.4.1 If urine is to be cultured but cannot be cultured within 4 hours of collection, the sample should be refrigerated or preserved with boric acid immediately. [2007]

1.1.4.2 The manufacturer's instructions should be followed when boric acid is used to ensure the correct specimen volume to avoid potential toxicity against bacteria in the specimen. [2007]

## 1.1.5 Urine testing

1.1.5.1 For all diagnostic tests there will be a small number of false negative results; therefore clinicians should use clinical criteria for their decisions in cases where urine testing does not support the findings. [2007]

1.1.5.2 Refer all infants under 3 months with a suspected UTI (see table 1) to paediatric specialist care, and

- send a urine sample for urgent microscopy and culture
- manage in line with the NICE guideline on fever in under 5s. [2017]

1.1.5.3 Use dipstick testing for infants and children 3 months or older but younger than 3 years with suspected UTI.

- If both leukocyte esterase and nitrite are negative: do not start antibiotic treatment; do not send a urine sample for microscopy and culture unless at least 1 of the criteria in recommendation 1.1.6.1 apply.

- If leukocyte esterase or nitrite, or both are positive: start antibiotic treatment; send a urine sample for culture. **[2017]**

> To find out why the committee made the 2017 recommendations on urine testing and how they might affect practice, see rationale and impact.

1.1.5.4 The urine-testing strategy shown in table 2 is recommended for children aged 3 years or older[1]. **[2007]**

1.1.5.5 Follow the guidance in table 3 on interpreting microscopy results. **[2007]**

## Table 2 Urine-testing strategies for children 3 years or older

| Dipstick testing for leukocyte esterase and nitrite is diagnostically as useful as microscopy and culture, and can safely be used. | |
|---|---|
| **If both leukocyte esterase and nitrite are positive** | The child should be regarded as having UTI and antibiotic treatment should be started. If a child has a high or intermediate risk of serious illness and/or a past history of previous UTI, a urine sample should be sent for culture. |
| **If leukocyte esterase is negative and nitrite is positive** | Antibiotic treatment should be started if the urine test was carried out on a fresh sample of urine. A urine sample should be sent for culture. Subsequent management will depend upon the result of urine culture. |
| **If leukocyte esterase is positive and nitrite is negative** | A urine sample should be sent for microscopy and culture. Antibiotic treatment for UTI should not be started unless there is good clinical evidence of UTI (for example, obvious urinary symptoms). Leukocyte esterase may be indicative of an infection outside the urinary tract which may need to be managed differently. |
| **If both leukocyte esterase and nitrite are negative** | The child should not be regarded as having UTI. Antibiotic treatment for UTI should not be started, and a urine sample should not be sent for culture. Other causes of illness should be explored. |

## Table 3 Guidance on the interpretation of microscopy results

| Microscopy results | Pyuria positive | Pyuria negative |
|---|---|---|
| Bacteriuria positive | The infant or child should be regarded as having UTI | The infant or child should be regarded as having UTI |
| Bacteriuria negative | Antibiotic treatment should be started if clinically UTI | The infant or child should be regarded as not having UTI |

## 1.1.6 Indication for culture

1.1.6.1 Urine samples should be sent for culture:

- in infants and children who are suspected to have acute pyelonephritis/upper urinary tract infection (see 1.1.8.1)
- in infants and children with a high to intermediate risk of serious illness
- in infants under 3 months
- in infants and children with a positive result for leukocyte esterase or nitrite
- in infants and children with recurrent UTI
- in infants and children with an infection that does not respond to treatment within 24–48 hours, if no sample has already been sent
- when clinical symptoms and dipstick tests do not correlate. **[2017]**

## 1.1.7 History and examination on confirmed UTI

1.1.7.1 The following risk factors for UTI and serious underlying pathology should be recorded:

- poor urine flow
- history suggesting previous UTI or confirmed previous UTI
- recurrent fever of uncertain origin
- antenatally diagnosed renal abnormality

- family history of vesicoureteric reflux (VUR) or renal disease
- constipation
- dysfunctional voiding
- enlarged bladder
- abdominal mass
- evidence of spinal lesion
- poor growth
- high blood pressure. [2007]

## 1.1.8 Clinical differentiation between acute pyelonephritis/upper urinary tract infection and cystitis/lower urinary tract infection

1.1.8.1 Infants and children who have bacteriuria and fever of 38°C or higher should be considered to have acute pyelonephritis/upper urinary tract infection. Infants and children presenting with fever lower than 38°C with loin pain/tenderness and bacteriuria should also be considered to have acute pyelonephritis/upper urinary tract infection. All other infants and children who have bacteriuria but no systemic symptoms or signs should be considered to have cystitis/lower urinary tract infection. [2007]

## 1.1.9 Laboratory tests for localising UTI

1.1.9.1 C-reactive protein alone should not be used to differentiate acute pyelonephritis/upper urinary tract infection from cystitis/lower urinary tract infection in infants and children. [2007]

## 1.1.10 Imaging tests for localising UTI

1.1.10.1 The routine use of imaging in the localisation of a UTI is not recommended. [2007]

1.1.10.2 In the rare instances when it is clinically important to confirm or exclude acute pyelonephritis/upper urinary tract infection, power Doppler ultrasound is recommended. When this is not available or the diagnosis still cannot be

confirmed, a dimercaptosuccinic acid (DMSA) scintigraphy scan is recommended. [2007]

## 1.2 Acute management

Note that the antibiotic requirements for infants and children with conditions that are outside the scope of this guideline (for example, infants and children already known to have significant pre-existing uropathies) have not been addressed and may be different from those given here.

1.2.1.1 Infants and children with a high risk of serious illness should be referred urgently to the care of a paediatric specialist. [2007]

1.2.1.2 Infants younger than 3 months with a possible UTI should be referred immediately to the care of a paediatric specialist. Treatment should be with parenteral antibiotics in line with the NICE guideline on fever in under 5s. [2007]

1.2.1.3 For infants and children 3 months or older with acute pyelonephritis/upper urinary tract infection:

- consider referral to a paediatric specialist
- treat with antibiotics in line with the NICE guideline on pyelonephritis (acute): antimicrobial prescribing. [2007, amended 2018]

1.2.1.4 For infants and children 3 months or older with cystitis/lower urinary tract infection:

- treat with antibiotics in line with the NICE guideline on urinary tract infection (lower): antimicrobial prescribing. [2007, amended 2018]

1.2.1.5 This recommendation has been replaced by the NICE guideline on pyelonephritis (acute): antimicrobial prescribing.

1.2.1.6 This recommendation has been replaced by the NICE guideline on pyelonephritis (acute): antimicrobial prescribing.

1.2.1.7 This recommendation has been replaced by the NICE guidelines on pyelonephritis (acute): antimicrobial prescribing, urinary tract infection (lower):

antimicrobial prescribing and urinary tract infection (recurrent): antimicrobial prescribing.

1.2.1.8 Asymptomatic bacteriuria in infants and children should not be treated with antibiotics. [2007]

1.2.1.9 Laboratories should monitor resistance patterns of urinary pathogens and make this information routinely available to prescribers. [2007]

### 1.2.2 Prevention of recurrence

1.2.2.1 Dysfunctional elimination syndromes and constipation should be addressed in infants and children who have had a UTI. [2007]

1.2.2.2 Children who have had a UTI should be encouraged to drink an adequate amount. [2007]

1.2.2.3 Children who have had a UTI should have ready access to clean toilets when required and should not be expected to delay voiding. [2007]

### 1.2.3 Antibiotic prophylaxis

1.2.3.1 Antibiotic prophylaxis should not be routinely recommended in infants and children following first-time UTI. [2007]

1.2.3.2 This recommendation has been replaced by the NICE guideline on urinary tract infection (recurrent): antimicrobial prescribing.

1.2.3.3 Asymptomatic bacteriuria in infants and children should not be treated with prophylactic antibiotics. [2007]

## 1.3 Imaging tests

1.3.1.1 Infants and children with atypical UTI (see box 1) should have ultrasound of the urinary tract during the acute infection to identify structural abnormalities of the urinary tract such as obstruction, as outlined in tables 4, 5 and 6. This is to ensure prompt management. [2007]

1.3.1.2 For infants younger than 6 months with first-time UTI that responds to

treatment, ultrasound should be carried out within 6 weeks of the UTI, as outlined in table 4. [2007]

1.3.1.3 For infants and children aged 6 months and older with first-time UTI that responds to treatment, routine ultrasound is not recommended unless the infant or child has atypical UTI, as outlined in tables 5 and 6. [2007]

1.3.1.4 Infants and children who have had a lower urinary tract infection should undergo ultrasound (within 6 weeks) only if they are younger than 6 months or have had recurrent infections. [2007]

1.3.1.5 A DMSA scan 4–6 months following the acute infection should be used to detect renal parenchymal defects, as outlined in tables 4, 5 and 6. [2007]

1.3.1.6 If the infant or child has a subsequent UTI while awaiting DMSA, the timing of the DMSA should be reviewed and consideration given to doing it sooner. [2007]

1.3.1.7 Routine imaging to identify VUR is not recommended for infants and children who have had a UTI, except in specific circumstances, as outlined in tables 4, 5 and 6. [2007]

1.3.1.8 When a micturating cystourethrogram (MCUG) is performed, prophylactic antibiotics should be given orally for 3 days with MCUG taking place on the second day. [2007]

1.3.1.9 Infants and children who have had a UTI should be imaged as outlined in tables 4, 5 and 6. [2007]

## Table 4 Recommended imaging schedule for infants younger than 6 months

| Test | Responds well to treatment within 48 hours | Atypical UTI[a] | Recurrent UTI[a] |
|---|---|---|---|
| Ultrasound during the acute infection | No | Yes[c] | Yes |
| Ultrasound within 6 weeks | Yes[b] | No | No |

| | | | |
|---|---|---|---|
| DMSA 4–6 months following the acute infection | No | Yes | Yes |
| MCUG | No | Yes | Yes |

[a] See box 1 for definition.

[b] If abnormal consider MCUG.

[c] In an infant or child with a non-*E. coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks.

## Table 5 Recommended imaging schedule for infants and children 6 months or older but younger than 3 years

| Test | Responds well to treatment within 48 hours | Atypical UTI[a] | Recurrent UTI[a] |
|---|---|---|---|
| Ultrasound during the acute infection | No | Yes[c] | No |
| Ultrasound within 6 weeks | No | No | Yes |
| DMSA 4–6 months following the acute infection | No | Yes | Yes |
| MCUG | No | No[b] | No[b] |

[a] See box 1 for definition.

[b] While MCUG should not be performed routinely it should be considered if the following features are present:

- dilatation on ultrasound
- poor urine flow
- non-E. coli-infection
- family history of VUR.

[c] In an infant or child with a non-*E. coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks.

## Table 6 Recommended imaging schedule for children 3 years or older

| Test | Responds well to treatment within 48 hours | Atypical UTI[a] | Recurrent UTI[a] |
|---|---|---|---|
| Ultrasound during the acute infection | No | Yes[b c] | No |
| Ultrasound within 6 weeks | No | No | Yes[b] |
| DMSA 4–6 months following the acute infection | No | No | Yes |
| MCUG | No | No | No |

[a] See box 1 for definition.

[b] Ultrasound in toilet-trained children should be performed with a full bladder with an estimate of bladder volume before and after micturition.

[c] In a child with a non-*E. coli*-UTI, responding well to antibiotics and with no other features of atypical infection, the ultrasound can be requested on a non-urgent basis to take place within 6 weeks.

**Box 1 Definitions of atypical and recurrent UTI**

**Atypical UTI includes:**

- seriously ill (for more information refer to the NICE guideline on fever in under 5s)
- poor urine flow
- abdominal or bladder mass
- raised creatinine
- septicaemia
- failure to respond to treatment with suitable antibiotics within 48 hours
- infection with non-*E. coli* organisms

**Recurrent UTI:**

- 2 or more episodes of UTI with acute pyelonephritis/upper urinary tract infection, or
- 1 episode of UTI with acute pyelonephritis/upper urinary tract infection plus one or more episode of UTI with cystitis/lower urinary tract infection, or
- 3 or more episodes of UTI with cystitis/lower urinary tract infection

## 1.4 Surgical intervention

1.4.1.1 Surgical management of VUR is not routinely recommended. [2007]

## 1.5 Follow-up

1.5.1.1 Infants and children who do not undergo imaging investigations should not routinely be followed up. [2007]

1.5.1.2 The way in which the results of imaging will be communicated should be agreed with the parents or carers or the young person as appropriate. [2007]

1.5.1.3 When results are normal, a follow-up outpatient appointment is not routinely required. Parents or carers should be informed of the results of all the investigations in writing. [2007]

1.5.1.4 Infants and children who have recurrent UTI or abnormal imaging results should be assessed by a paediatric specialist. [2007]

1.5.1.5 Assessment of infants and children with renal parenchymal defects should include height, weight, blood pressure and routine testing for proteinuria. [2007]

1.5.1.6 Infants and children with a minor, unilateral renal parenchymal defect do not need long-term follow-up unless they have recurrent UTI or family history or lifestyle risk factors for hypertension. [2007]

1.5.1.7 Infants and children who have bilateral renal abnormalities, impaired kidney function, raised blood pressure and/or proteinuria should receive monitoring and appropriate management by a paediatric nephrologist to slow the progression of chronic kidney disease. [2007]

1.5.1.8 Infants and children who are asymptomatic following an episode of UTI should not routinely have their urine re-tested for infection. [2007]

1.5.1.9 Asymptomatic bacteriuria is not an indication for follow-up. [2007]

## 1.6 Information and advice for children, young people and parents or carers

1.6.1.1 Healthcare professionals should ensure that when a child or young person has been identified as having a suspected UTI, they and their parents or carers as appropriate are given information about the need for treatment, the importance of completing any course of treatment and advice about prevention and possible long-term management. [2007]

1.6.1.2 Healthcare professionals should ensure that children and young people, and their parents or carers as appropriate, are aware of the possibility of a UTI recurring and understand the need for vigilance and to seek prompt treatment from a healthcare professional for any suspected reinfection. [2007]

1.6.1.3 Healthcare professionals should offer children and young people and/or their parents or carers appropriate advice and information on:

- prompt recognition of symptoms
- urine collection, storage and testing
- appropriate treatment options
- prevention
- the nature of and reason for any urinary tract investigation
- prognosis
- reasons and arrangements for long-term management if required. [2007]

# Terms used in this guideline

## Bacteriuria

Bacteria in the urine with or without urinary tract infection.

## Pyuria

White cells in the urine.

[1] Assess the risk of serious illness in line with the NICE guideline on fever in under 5s to ensure appropriate urine tests and interpretation, both of which depend on the child's age and risk of serious illness.

# Putting this guideline into practice

NICE has produced tools and resources to help you put this guideline into practice.

Putting recommendations into practice can take time. How long may vary from guideline to guideline, and depends on how much change in practice or services is needed. Implementing change is most effective when aligned with local priorities.

Changes recommended for clinical practice that can be done quickly – like changes in prescribing practice – should be shared quickly. This is because healthcare professionals should use guidelines to guide their work – as is required by professional regulating bodies such as the General Medical and Nursing and Midwifery Councils.

Changes should be implemented as soon as possible, unless there is a good reason for not doing so (for example, if it would be better value for money if a package of recommendations were all implemented at once).

Different organisations may need different approaches to implementation, depending on their size and function. Sometimes individual practitioners may be able to respond to recommendations to improve their practice more quickly than large organisations.

Here are some pointers to help organisations put NICE guidelines into practice:

1. **Raise awareness** through routine communication channels, such as email or newsletters, regular meetings, internal staff briefings and other communications with all relevant partner organisations. Identify things staff can include in their own practice straight away.

2. **Identify a lead** with an interest in the topic to champion the guideline and motivate others to support its use and make service changes, and to find out any significant issues locally.

3. **Carry out a baseline assessment** against the recommendations to find out whether there are gaps in current service provision.

4. **Think about what data you need to measure improvement** and plan how you will collect it. You may want to work with other health and social care organisations and specialist groups to compare current practice with the recommendations. This may also help identify local issues that will slow or prevent implementation.

5. **Develop an action plan**, with the steps needed to put the guideline into practice, and make sure it is ready as soon as possible. Big, complex changes may take longer to implement, but some may be quick and easy to do. An action plan will help in both cases.

6. **For very big changes** include milestones and a business case, which will set out additional costs, savings and possible areas for disinvestment. A small project group could develop the action plan. The group might include the guideline champion, a senior organisational sponsor, staff involved in the associated services, finance and information professionals.

7. **Implement the action plan** with oversight from the lead and the project group. Big projects may also need project management support.

8. **Review and monitor** how well the guideline is being implemented through the project group. Share progress with those involved in making improvements, as well as relevant boards and local partners.

NICE provides a comprehensive programme of support and resources to maximise uptake and use of evidence and guidance. See our into practice pages for more information.

Also see Leng G, Moore V, Abraham S, editors (2014) Achieving high quality care – practical experience from NICE. Chichester: Wiley.

# Context

In the past 30–50 years, the natural history of urinary tract infection (UTI) in children has changed as a result of the introduction of antibiotics and improvements in healthcare. This change has contributed to uncertainty about the most appropriate and effective way to manage UTI in children, and whether or not investigations and follow-up are justified.

UTI is a common bacterial infection causing illness in infants and children. It may be difficult to recognise UTI in children because the presenting symptoms and signs are non-specific, particularly in infants and children younger than 3 years. Collecting urine and interpreting results are not easy in this age group, so it may not always be possible to unequivocally confirm the diagnosis.

Current management, which includes imaging, prophylaxis and prolonged follow-up, has placed a heavy burden on NHS primary and secondary care resources. It is costly, based on limited evidence and is unpleasant for children and distressing for their parents or carers. The guideline has been developed with the aim of providing guidance on several aspects of UTI in infants and children from birth up to the age of 16 years, including: when to consider the diagnosis of UTI in sick and/or symptomatic infants and children who were previously healthy; urine collection for the diagnosis of UTI in infants and children; tests to establish or exclude UTI; treatment, including symptomatic reinfection; use of prophylactic antibiotics and investigations to assess the structure and function of the urinary tract; referral to secondary and tertiary care; surgical intervention; long-term follow-up; and advice to give to parents or carers, including what to do if another UTI occurs.

Areas not addressed by the guideline include children with urinary catheters in situ, children with neurogenic bladders, children already known to have significant pre-existing uropathies, children with underlying renal disease (for example, nephrotic syndrome), immunosupressed children, and infants and children in intensive care units. It also does not cover preventive measures or long-term management of sexually active girls with recurrent UTI.

In 2017, we updated the recommendations on urine testing strategies for infants and children under 3 years.

# More information

You can also see this guideline in the NICE Pathway on urinary tract infections.

To find out what NICE has said on topics related to this guideline, see our web page on urological conditions.

# Recommendations for research

In 2007, the guideline committee made the following recommendations for research. The committee's full set of research recommendations is detailed in the full guideline.

## 1 Long-term risk

A well designed cohort study investigating long-term outcomes including renal scarring and renal function of children who have had UTI should be conducted in the UK.

### Why this is important

UTI and VUR in young children have been shown to be associated with both congenital and acquired renal damage. Progressive scarring is well documented in children with high grade VUR and recurrent UTI. Scarring has been associated with severe hypertension, proteinuria, complications in pregnancy and progression to established renal failure. These risks are likely to be greater in children with bilateral renal parenchymal defects. However, the frequency and magnitude of these risks for children with unilateral and bilateral renal damage are unclear. Knowledge of the risk of serious or progressive complications would be useful to determine the management of children with first-time and recurrent UTIs.

# Rationale and impact

This section summarises why the committee made the recommendations and how they might affect practice.

# Urine testing

## Why the committee made the 2017 recommendations

Evidence showed that a positive urine dipstick test for leukocyte esterase or nitrite in children 3 months or older but younger than 3 years greatly increases the likelihood of finding a positive urine culture. Sending only positive samples for culture offered a better balance of benefits and costs for these children than prescribing antibiotics and urine culture for all children. The committee agreed that there are concerns about sepsis in infants under 3 months with suspected UTI, and usual practice is referral rather than the GP managing symptoms. So the committee recommended that all children under 3 months should be referred to specialist paediatric care and have a urine sample sent for urgent microscopy and culture. In children aged 3 months or older but younger than 3 years, symptoms are easier to identify, and antibiotics should only be started if a dipstick test is positive for either or both leukocyte esterase or nitrite. Children in this age group with a positive dipstick test should also have a urine sample sent for culture.

## How the 2017 recommendations might affect practice

Recommending dipstick testing in infants and children aged 3 months or older but younger than 3 years clarifies the role of dipstick testing in this age group and encourages immediate diagnosis and treatment in primary care. The committee believe the new recommendations will provide concise and clear guidance for health care professionals, more efficient diagnosis for infants and children, and cost savings and a reduced burden on laboratories by reducing the number of urine samples sent for culture.

For full details of the evidence and the committee's discussion, see the evidence reviews on diagnosing UTIs in children under 3 years.

# Update information

**October 2018:** Recommendations 1.2.1.3 and 1.2.1.4 have been amended to bring them into line with NICE's guidelines on pyelonephritis (acute): antimicrobial prescribing and urinary tract infection (lower): antimicrobial prescribing, respectively. Recommendations 1.2.1.5 to 1.2.1.7 and recommendation 1.2.3.2 have been replaced by NICE's guidelines on pyelonephritis (acute): antimicrobial prescribing, urinary tract infection (lower): antimicrobial prescribing and urinary tract infection (recurrent): antimicrobial prescribing.

**September 2017:** We reviewed the evidence on urine testing strategies for infants and children under 3 years and updated recommendations in section 1.1.5.

| |
|---|
| Recommendations are marked as **[2007, amended 2018]**, **[2017]** or **[2007]**. |
| **[2007, amended 2018]** indicates that the recommendation was updated as a post-publication change in 2018. |
| **[2017]** indicates that the evidence was reviewed and the recommendation updated in 2017. |
| **[2007]** indicates that the evidence was reviewed in 2007. |

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# Accreditation

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عوامل الخطورة : جدول رقم (١)

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| | | | |
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| ٢ – السوائل<br>٣ – مبرمج للجراحة | | | |
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| هل اعطيت الصادات الوقائية وفق الاستطبابات | | | |

عوامل الخطورة جدول رقم (١)

شح بول – تاريخ الألتهاب حويضة وكلية متكرر – حرارة متكررة دون التهاب واضح في عضو معين – مرض كلوي أو طرق بولية غير طبيعية – امساك – سوء وظيفة افراغية – توسع المثانة – كتلة بطنية – إصابة نخاع شوكي – فشل نمو – ارتفاع في ضغط الدم – الذكر غير المختون

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جدول رقم (٢) استطبابات زرع البول :

١- العمر أقل من ٣ سنوات
٢- كريات بيض في البول أو نتريت
٣- UTI متكرر
٤- انتان لايتحسن على العلاج خلال ٢٤ -٤٨ ساعة
٥- الأعراض السريرية لاتتوافق مع المخبريات
٦- شك التهاب حويضة وكلية ( أعراض جهازية )

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جدول رقم (٣) الانتان البولي اللانموذجي :

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٢- شح صادر بولي

٣- كتلة بطنية أو مثانية

٤- ارتفاع كرياتينين الدم

٥- انتان دم

٦- الفشل في الاستجابة للعلاج خلال ٤٨ ساعة

٧- انتان بعصيات غير E .COLI

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جدول رقم (٤) التهاب الحويضة والكلية المتكرر

١- مرتين أو أكثر من انتان بولي مع التهاب حويضة وكلية حاد

٢- هجمة حادة من انتان بولي علوي + مرة أو أكثر من انتان بولي سفلي مع التهاب مثانة ٣ مرات أو أكثر من انتان بولي سفلي مع التهاب مثانة .