A critical review of recent clinical practice guidelines for pediatric urinary tract infection

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Abstract

Introduction: Concerns regarding the quality, credibility, and applicability of recently published pediatric urinary tract infection (UTI) clinical practice guidelines have been raised due to the inconsistencies of recommendations between them. We aimed to determine the quality of the recent clinical practice guidelines on pediatric UTI by using the Appraisal of Guidelines Research and Evaluation (AGREE II) instrument, and summarize the standard of care in diagnosis and management of pediatric UTI from the top three clinical practice guidelines.
Methods: A systematic literature search was performed on medical literature electronic databases and international guideline repository websites. English language-based clinical practice guidelines from 2007–2016 endorsed by any international society or government organization providing recommendations for the management of pediatric UTI were considered. Eligible clinical practice guidelines were independently appraised by six reviewers using the AGREE II tool. Clinical practice guidelines were assessed for standardized domains and summarized for overall quality. Inter-rater reliability was assessed using inter-class coefficient (ICC).
Results: Thirteen clinical practice guidelines were critically reviewed. The Spanish clinical practice guidelines, American Academy of Pediatrics, and National Institute for Health and Clinical Excellence clinical practice guidelines consistently scored high on all AGREE domains (total averaged domain scores are 90, 88, and 88, respectively). Among the six reviewers, there was a high degree of inter-rater reliability (average measure ICC 0.938; $p<0.0001$). There is reasonable consensus among the top three clinical practice guidelines in their major recommendations.
Conclusions: The clinical practice guidelines from Spain, American Academy of Pediatrics, and National Institute for Health and Clinical Excellence, with their major recommendations being

similar, have scored highly on the AGREE II indicators of quality for the clinical practice guidelines development process.

Introduction

Urinary tract infection (UTI) represents one of the most common bacterial infections among infants and children (1). This condition if not managed appropriately, may result to significant morbidity; renal scarring in particular being the most worrisome long term sequale (1-3). According to the literature, the implementation of clinical practice guidelines (CPGs) for the management of UTI in children may be associated with significantly better outcomes (4, 5). However, multiple clinical practice guidelines have been published, with significant variability and inconsistency in their recommendations; which leads to confusion and practical issues on implementation strategies (6-7). Likewise, concerns regarding the quality, credibility and applicability of CPGs have been raised (6-8). We hypothesized that these differences may be due to variation in the quality of guideline development process.

The AGREE Collaboration (Appraisal of Guidelines, Research and Evaluation), an international team of guideline developers and researchers, configured an instrument to assess the process and reporting of guideline development (9). The collaboration created a 23-item tool aimed at 6 quality-related domains to evaluate the quality standard of CPGs (10). In 2010, the AGREE II tool was introduced as the updated version was recommended by the consortium as the preferred instrument for guideline development, reporting and evaluation (9-10).

The aim of this project was to determine the quality of the CPGs on pUTI using the AGREE II instrument. We also aimed to help clinicians by comparing, contrasting and synthesizing the evidence-based recommendations for the diagnosis, assessment and treatment of pediatric UTI across the highest scoring guidelines.

Methods

This review complied with the standard reporting recommended by PRISMA statement (11). Prior to review, the study protocol was circulated among the reviewer group. Consensus was made to include only those documents identified as CPGs endorsed by any international society or government organization providing recommendations to guideclinical decision-making in diagnosing and treating pediatric UTI. Only English language based CPGs were assessed. Publications such as narrative reviews, primary research, training manuals, patient and allied health professional guidelines, and technical guides were excluded. CPGs released prior to 2007 and or searches before 2006 were also excluded. If a CPG was already endorsed by a major umbrella professional organization, then the CPGs from its subsection or sub-organization were not considered to reduce redundancy. CPGs for which development methods could not be verified due to the original documents being unavailable were likewise excluded. Only the latest version of the CPG was included.

CPG search, identification, and screening

The systematic literature search was performed by two reviewers independently in August 2016 for electronic databases (Pubmed, EMBASE, Scopus, US AHRQ (Agency for Healthcare Research and Quality), NICE (National Institute for Health and Care Excelence-UK), NHMRC (Australian Gov't National Health and Medical Research Council), SIGN (Scottish Intercollegiate Guideline network), Canadian Infobase Guideline, GIN (Guideline International Network), TRIP (translate research into practice) website, Googlescholar, BMJ Best practice search, Wiley online Library and Cochrane online Library. A complex search strategy included both ‘‘MeSH’’ (Medical Subject Heading) and ‘‘free text’’ protocols. Specifically, the MeSH terms (‘‘urinary tract infections’’ OR “infections” OR “pyelonephritis” OR “cystitis” OR “UTI”) AND (”Pediatrics” OR “children”) AND (“Practice guideline” OR “guideline” OR “CPG”). Multiple ‘‘free text’’ searches were performed by applying the following terms through all fields: “cystistis,” “UTI,” “children,” and “CPG.” Experts of the fieldand regional professional organizations were contacted for any unpublished or draft guidelines. Relevant articles were also retrieved and cross-referenced to identify additional CPGs.

CPG appraisal and summary

A review team consisting of 6 physician representatives from different specialties, including general pediatrics, pediatric nephrology, pediatric urology, and general urology were involved in the CPG evaluation. All members were oriented with the AGREE II tool and underwent the online tutorial. To critically and effectively appraise CPGs, and to reinforce consistency during appraisal, a clinical methodologist facilitator and a field expert was involved to settle discrepancies or uncertainties. CPGs were independently appraised by each member and rated according to each domain according to the AGREE II tool (9). In order to avoid under-evaluation, all means were undertaken to assess the CPG documents; reviewers were requested to individually access the CPGs documents as well as the websites, supplementary and accompanied files associated with CPGs. Evaluation results from all appraisers were collected and tabulated. The appraisal score for each guideline was extrapolated for each AGREE domain and in overall total. Standardized domain scores were calculated according to AGREE II tool manual as follows (10):

$$= \frac{\text{Obtained score – minimum possible score}}{\text{Maximum possible score – minimum possible score}}$$

Inter-rater reliability among the reviewers for each CPG was determined using interclass correlation coefficient (ICC) statistical analysis. The averaged total scores were standardized for each CPG by calculating the overall standardized domain scores. For the purpose of this critical appraisal, a domain score of less than 70 is considered low, an averaged total score of 80 for CPGs is considered satisfactory. The CPGs were then ranked according to the overall scores and assessed for each domain scores.

One physician reviewer independently extracted the recommendation items from the top three CPGs using a standardized data extraction form; while another reviewer verified the extracted summary. The extracted data includes CPG source, scopes, objectives, and recommendations in pediatric UTI management.

Results

The result of systematic literature search from the online databases is summarized in Figure 1. After removal of duplicate records, 1784 publications remained. Further screening of the records based on the document abstracts and synopsis, left only 27 documents of CPGs for potential evaluation Eleven guidelines were rejected as follows: 5 non-English guidelines (Chinese (in Chinese language) 2010, German (in German language)- 2007, Chile (In Spanish language) 2012, French Infection disease society and French Pediatric Society (in French) 2014, Portugal (In Portuguese Language) 2012; three single - authored guidelines Sri Lankan, Korean, the AAFP, and one with the methodology could not be verified (Australian AFP). The Saudi (2010) guideline was excluded due to the document not being endorsed by any organization but rather more of a narrative review document. The 2010 AUA VUR guidelineswere also excluded as this document does not discuss management of pediatric UTI specifically. A total of 16 documents with13 CPGs remained and were critically reviewed (12-27).

AGREE instrument scores

Amongst the 6 reviewers, there was a high degree of inter-rater reliability. The average measure ICC was 0.938 with a 95% confidence interval from 0.866 to .0.978 ($F(12, 60) = 16.141$ $p<.0001$). Table 1 summarizes the overall and individual domain scores of each of the included CPGs as assessed according to the AGREE II tool evaluation. The domains that scored highest among each CPG were the clarity of presentation, scope and objective. However, out of 13 CPGs, 10 had scores <70 for the domains of applicability, while the domains of stakeholder involvement and rigor of development were low in 9 CPGs. The Spanish guideline for pediatric UTI, American Academy of Pediatrics (AAP) and National Institute for Health and Clinical Excellence (NICE) guidelines consistently scored high on all AGREE domains. These CPGs were also being ranked as the top three overall. (Table 1)

Comparisons of scope, purpose, and content of top three ranked CPGs

Supplementary Table 1 summarizes the similarities and differences of the top three CPGs. The objective of the top three CPGs were similar, where all aimed to improve clinical practice parameters in the management of pUTI. However, there were differences in the scope among these CPGs. For the Spanish pUTI CPG, the target population age ranges 1month to 18 year old, whereas the NICE CPG, the target pediatric population is <16 years old, and the AAP CPG, they only targeted the pediatric population of 2-24 month of age where the authors indicated the evidence support was generated from studies of infants 2 to 24 months of age and did not believe it could be applied to children more than 24 months of age and less than 2 months old.

Review of key recommendations

Urine collection method
Due to age range difference, midstream clean catch urine specimen was recommended by the Spanish and NICE CPGs. While urethral catheterization and suprapubic aspiration (SPA), were preferred method of urine specimen collection by all three CPGs.

Urine specimen transport and preservation
All three guidelines agreed that the ideal window for urine examination is within 4 hours of collection of the specimen whereas the AAP CPG is more strict recommending that room temperature specimens should be processed <1 hour.

Urine microscopy
Both Spanish and NICE CPGs strongly recommend urine microscopy testing for patients less than three month old. Likewise, both CPGs have included leucocyte esterase, nitrites, presence of pyuria and bacteriuria as guide to management of the patient. However the AAP guideline imposed a more strict recommendation that in order to establish the diagnosis of UTI, both positive urinalysis results (pyuria and/or bacteriuria) and the presence of at least 50,000 colony-forming units (CFUs) per mL of an uropathogen cultured should be required and specifically that the specimen obtained through catheterization or SPA.

Blood testing to determine upper tract involvement of UTI
The Spanish CPG considers the test results of acute reactive protein, interleukin 6, C-reactive protein (CRP) and procalcitonin. While NICE CPG does not recommend C-RP to differentiate upper tract from lower tract involvement.

Diagnostic imaging
All three CPGs recommend ultrasound for the first febrile UTI in infants and older children and among patient with recurrent UTIs. All three CPGs recommend that routine radiologic work-up for VUR is not recommended after first UTI, except for cases where ultrasonography suggests either high-grade VUR or obstructive uropathy.

Prophylactic antibiotics
The Spanish CPG does not recommend giving prophylactic antibiotics for patient who will have a single catheterization such as for voiding cystourethrogram (VCUG); while NICE CPG recommends giving 3-4 day of prophylactic antibiotics with the procedure in the second day. Requesting Dimercaptosuccinic acid scan (DMSA) after 4-6 month from the initial UTI is recommended by both Spanish and NICE CPG to determine renal parenchymal damage if upper tract involvement is likely. Furthermore, it is recommended as part of investigation if the patient experiences recurrent UTI.

Acute management

All three CPGs agreed that oral administration of antibiotic is the preferred route for the treatment of pediatric UTI; however, in circumstances that oral administration is not possible, IV antibiotics maybe considered. For Spanish CPG, if the patient presents with suspected obstructive uropathy or high-grade VUR (IV–V), signs of septicaemia, uncontrollable vomiting or dehydration, then IV antibiotics should be initiated; while AAP considered both oral and IV are equally efficacious. All three CPGs recommend starting empiric antibiotics of choice according to local antibiogram then adjust based on urine culture sensitivity. Furthermore, it is also consistent among the three CPGs to reevaluate the patient clinical condition after 48hrs and advise parents to return for further evaluation if no improvement occurs.

Long-term management

For long term management of pediatric UTI, neither Spanish nor NICE CPGs recommend antibiotic prophylaxis for patients after the first UTI; however, prophylaxis may be considered for patients with recurrent UTI. The Spanish CPG recommends giving prophylactic antibiotics in the presence of urinary tract dilation and suspected obstruction until the diagnosis is confirmed and proper treatment is given, as well as for patients with high grade VUR only (3-5 in girls and 4-5 in boys) and reevaluate after 1 year. NICE CPG states that if a patient on prophylactic antibiotics developes a breakthrough UTI, the class of antibiotics should be changed and not to increase the dose of the same class of antibiotics. AAP does not have any recommendation for antibiotic prophylaxis, but stated that although the effectiveness of antimicrobial prophylaxis for UTI prevention has not yet been demonstrated, the concept has biological plausibility.

Preventive measures

Both Spanish and NICE CPGs recommend preventive measures to reduce recurrences of UTI, particularly focusing on the pattern of urinary tract dysfunction, bowel habits of the patient, adequate fluid intake and other behavioural modifications. Routine urine testing is not recommended as follow-up for asymptomatic patient with prior history of febrile UTI. According to both Spanish and NICE CPGs, infants and older children who have bilateral renal abnormalities should have regular monitoring to assess kidney function, blood pressure and/or proteinuria, and if detected, they should be seen and managed by a paediatric nephrologist appropriately to prevent or slow the progression of chronic kidney disease.

Discussion

To date, there are a number of CPGs available for the management of pediatric UTI. It is strongly contemplated that an objective tool with high inter-rater reliability for the evaluation of the CPGs shall give a better sense on how the CPG may help practice among clinicians. The AGREE II tool is widely-used to evaluate the quality standard of CPGs in different field of medicine to assess methodological rigour and transparency of guideline development (28). This CPG evaluation tool has been validated and tested for high reliability with detailed framework to assess the quality of guidelines in six standardized domains (9, 10, 28). To the best of our

knowledge, this is the first systematic review providing a critical appraisal of recent CPGs evaluating pediatric UTI.

Our study result showed that based on AGREE II tool evaluation, the quality of the available CPGs ranges. Using the AGREE II tool evaluation in this critical appraisal, our statistical analysis confirmed its high inter-rater reliability (average measure ICC = 0.938), which according to accepted standard is more than ideal (29, 30). Furthermore, this high inter-rater reliability was obtained from a team of reviewers representing different specialties that are considered the stakeholders of these CPGs.

Quality of the CPGs and domain scores

Out of 13 CPGs assessed, only three had an overall score of >80 from the averaged domain scores. The AGREE recommends evaluating the CPGs according to the individual domains rather than tallying the overall score; however, taking that into considerations, our review result showed that the scores in each domains correlate well with the overall total. Specifically, the top three guidelines consistently rated high (≥70) all domains.

The recently published CPGs do not have higher score compared to the earlier published CPGs. This implies that despite increased availability of high quality evidence and awareness of evidence based medicine through the years, there was no temporal relationship with the quality of the recent being published/ endorsed CPGs. Same findings werenoted in prior reviews on pediatric CPGs (31-33), which could be due to lack of awareness of AGREE II criteria leading to inadequate reporting. This also indicates that efforts are needed to increase recognition of the importance in improving the quality of the CPGs according to AGREE recommendation and engaging future CPG developers to adhere to the standard process making of the CPG.

Among the domains evaluated in the CPGs according to AGREE II tools, our assessment showed that clarity of presentation, scope and objective domains are the two domains that consistently rated higher than other domains among all the CPGs. While the domains on applicability, rigor of development and stakeholder involvement consistently rated low across all CPGs. These findings were similar to prior critical appraisal of other pediatric and adult CPGs (31-35).

It is important for the CPGs to have undergone a rigorous process of development with involvement of stakeholders in the formulation of recommendations, and to provide means for facilitation in implementing the guideline with monitoring/ auditing criteria. However, these are the domains that were consistently rated low among the CPGs. We strongly believe that these domains are the more important methodological quality standards that distinguish the credibility and usefulness among the CPG documents. Same proposition was made in a recent critical appraisal of adult non-neurogenic lower urinary tract management CPGs, that more prominence and weightshould be given to process development and to the means of facilitating implementation during evaluation of the guidelines (34).

Recommendations from the top tier CPGs

The major difference among the top three CPGs is the target population age range. Compared to the Spanish and NICE CPGs, the AAP CPG has a more restricted population targeting only 2-24 month old children with UTI. Since the covered patient population were non-toilet trained, the AAP also have a more strict definition for UTI diagnosis and stringent requirements for urine collection and preservation. The majority of recommendation for diagnostic criteria and acute management are consistent among the three CPGs. However, only the Spanish and NICE CPGs are able to give additional recommendations for long term management. The Spanish CPG was developed following recommendation of AGREE and also added de novo evidence for recommendation formulation.

Strengths and limitations of CPG critical appraisal

Having six physician reviewers representing different disciplines involved in this CPG critical appraisal using a validated tool (AGREE II) is the strength of this study. Furthermore, a high inter-rater reliability further added credibility to the assessment of each CPG. Also addressing the limitation of prior critical reviews of pediatric CPGs on the issue that AGREE II does not give a cut-off in determining the adequacy of CPG quality, we have decided on using an arbitrary priori cut-off of 70 to as the basis to show adequacy of quality. We also summarized the recommended standard of care across the top three guidelines, which shall give insights for the clinicians on the management of pediatric UTI. However, a limitation of this critical review lies on the fact that the top three CPGs were published more than 5 years ago, with their respective literature search and basis of recommendation not updated; although, AAP had just recently reaffirmed their 2011 recommendation statements. (36) We believe that according to the statement of the top three CPGs, their new versions will be soon available and we hope that the CPG development groups and organizations would consider our recommendation to follow the AGREE criteria when developing their revised CPG documents.

Conclusion

The CPGs from Spain, AAP and NICE scored highly on the AGREE II indicators of quality of the CPG development process. Domains of applicability, stakeholder involvement and rigor of development were suboptimal quality wise in the majority of the most recently available CPGs for pUTI. Clinicians are recommended to consider these findings when selecting pUTI guidelines for use in their particular practice.

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Figures and Tables

Fig. 1. PRISMA flow diagram of literature search process and results.

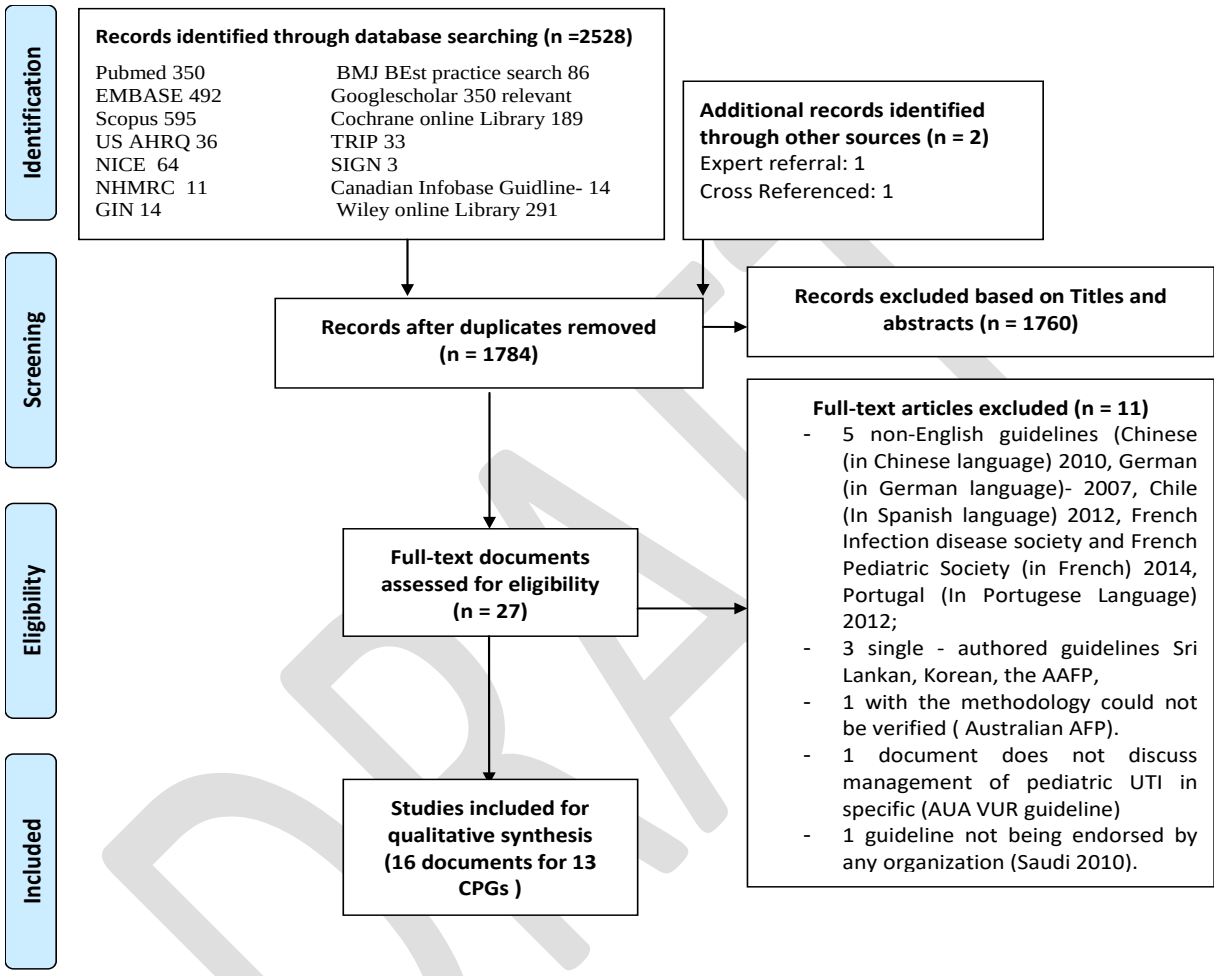

Figure1. PRISMA Flow Diagram of literature search process and result

Table 1. AGREE II appraisal of pUTI CPGs: Summary of six domain mean standardized scores and total averaged domain scores of included guidelines

	Spain 2011	**AAP 2011**	**NICE 2007**	**Australia 2015**	**ESPU 2015**	**Italian 2012**	**ACR 2012**	**Pakistan 2015**	**CPS 2015**	**AAUS 2016**	**Brazil 2015**	**Indian 2011**	**ESPR 2008**
Total averaged domains score	90	88	88	71	63	59	50	42	45	35	33	33	30
Domain 1. Scope and purpose	97	93	97	81	73	87	58	44	87	45	61	69	44
Domain 2. Stakeholder involvement	86	82	95	79	48	57	51	30	50	34	16	38	31
Domain 3. Rigour of development	96	94	87	73	65	34	42	41	25	28	18	17	13
Domain 4. Clarity of presentation	94	95	93	74	85	81	67	47	79	73	42	53	46
Domain 5. Applicability	78	70	71	51	36	22	42	19	18	18	11	18	30
Domain 6. Editorial independence	89	94	82	67	74	74	38	74	8	11	50	1	15

Supplementary Table 1. Summary of top three Tier pUTI CPGs recommendations*. (Lifted statements as per each guideline statements)			
	Spain	**NICE**	**AAP**
Year	**2011**	**2007**	**2011**
Scope and objectives	To improve clinical management of children with urinary tract infection	Aim of this guideline is to achieve more consistent clinical practice, based on accurate diagnosis and effective management of UTI in children…	To revise the American Academy of Pediatrics practice parameter regarding the diagnosis and management of initial urinary tract infections (UTIs) in febrile infants and young children.
	Target population- children from 1 month to 18 years old with suspected UTI	…on the care of infants, children and young people younger than 16 years with UTI…	focuses on the diagnosis and management of initial urinary tract infections (UTIs) in febrile infants and young children (2–24 months of age) who have no obvious neurologic or anatomic abnormalities known to be associated with recurrent UTI or renal damage.
	Intended for health professionslas in primary care and specialist care	…all healthcare professionals involved in providing care for children who have a UTI (including GPs, nurses, pediatricians, nephrologists and urologists) those responsible for commissioning and planning healthcare services, including primary care trust commissioners, Health Commission Wales commissioners, and public health and trust managers c) children who have UTI and their families.	Intended for use in a variety of clinical settings (eg, office, emergency department, or hospital) by clinicians who treat infants and young children
Evidence and Recommendation Grading System	SIGN	NICE	AAP policy
Diagnosis			
Clinical	A - Clinical suspicion of UTI in children from the clinical manifestations requires laboratory confirmation, due to its low discriminative ability.	Infants and children presenting with unexplained fever of 38 °C or higher should have a urine sample tested after 24 hours at the latest.	If a clinician decides that a febrile infant with no apparent source for the fever requires antimicrobial therapy to be administered because of ill appearance or another pressing reason, the clinician should ensure that a urine specimen is obtained for both culture and urinalysis before an antimicrobial agent is administered; the specimen needs to be obtained through catheterization or SPA, because the diagnosis of UTI cannot be established reliably through culture of urine collected in a bag (evidence quality: A; strong recommendation).
	A - In children under 24 months of age with fever without focus it is recommended to take a urine test to rule out UTI.	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.	If a clinician assesses a febrile infant with no apparent source for the fever as not being so ill as to require immediate antimicrobial therapy, then the clinician should assess the likelihood of UTI (see below for how to assess likelihood).

	A - In children over 24 months old, with symptoms of abdominal or back pain, fever, dysuria, frequency or both, or the onset of incontinence it is recommended to take a urine test to confirm UTI.	Infants and children with symptoms and signs suggestive of urinary tract infection (UTI) should have a urine sample tested for infection. a guide was provided to the symptoms and signs that infants and children present with.	If the clinician determines the febrile infant to have a low likelihood of UTI (see text), then clinical follow-up monitoring without testing is sufficient (evidence quality: A; strong recommendation).
Biological			
Urine collection method	B - For children who can control urination, a midstream clean catch urine sample is recommended.	A clean catch urine sample is the recommended method for urine collection.	If the clinician determines that the febrile infant is not in a low-risk group (see below), then there are 2 choices (evidence quality: A; strong recommendation).
	C - For children who cannot control urination that require immediate diagnosis and/or treatment, it is recommended to use a collection technique that minimises the risk of contamination (suprapubic aspiration [SPA] or bladder catheterisation). The choice of technique should be subject to the level of training and resources of the health care centre.	When it is not possible or practical to collect urine by non-invasive methods, catheter samples or suprapubic aspiration (SPA) should be used.	Option 1 is to obtain a urine specimen through catheterization or SPA for culture and urinalysis.
	C - For children who cannot control urination that do not require immediate diagnosis and/or treatment, use a well performed non-invasive urine collection technique (perineal bag or clean catch).	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.	Option 2 is to obtain a urine specimen through the most convenient means and to perform a urinalysis.
	D - If the analysis of urine collected by a non-sterile technique (perineal bag) is contaminated, it is recommended to confirm it by taking a repeat sample using techniques that minimise the risk of contamination. The choice of technique will depend on the patient's clinical status, level of collection training and healthcare setting resources.	.	.
	A - It is recommended to use ultrasound, if available, to improve the effectiveness of suprapubic aspiration, when this is chosen.	Before SPA is attempted, ultrasound guidance should be used to demonstrate the presence of urine in the bladder.	.
	GCP - It is recommended that patient care points that offer suprapubic aspiration should have ultrasound.	.	.
	.	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.	.
Preserving and Transporting urine Samples	C - It is recommended to process urine samples within 4 hours so they are not affected by bacterial growth.	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.	The specimen must be fresh (<1 hour after voiding with maintenance at room temperature or <4 hours after voiding with refrigeration),to ensure sensitivity and specificity of the urinalysis.

	C - If it is not possible to start the urine culture analysis within 4 hours, it is recommended to refrigerate the urine to be used to detect bacteriuria immediately after collection.	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.	Urine specimens should be processed as expediently as possible. If the specimen is not processed promptly, then it should be refrigerated to prevent the growth of organisms that can occur in urine at room temperature; for the same reason, specimens that require transportation to another site for processing should be transported on ice.
	C - When refrigeration is not possible and the urine is to be processed between 4 and 24 hours after collection, preservatives may be employed as major delays can lead to bacterial growth.	.	.
	GCP - It is recommended not to consider the results of some urinary profile parameters (nitrite and glucose) from urine with chemical preservatives added, as they may not be valid.	.	.
	GCP - When using chemical preservatives, ensure the minimum volume of urine sample recommended by the manufacturer is taken.	.	.
Diagnostic			
urine test	B - It is recommended to perform an urgent Gram-stain microscopic examination of urine and urine culture on infants under 3 months with suspected UTI.	All infants younger than 3 months with suspected UTI should be referred to paediatric specialist care and a urine sample should be sent for urgent microscopy and culture.	Urinalysis cannot substitute for urine culture to document the presence of UTI but needs to be used in conjunction with culture.
	B - It is recommended to perform a urine microscopic examination or, failing that, a dipstick test and urine culture on patients with suspected UTI who are younger than 2 years or who cannot control urination. If there is a strong clinical suspicion of UTI or the patient is at risk of severe disease, these tests must be performed urgently.	Urgent microscopy and culture is the preferred method for diagnosing UTI in this age group; this should be used where possible.	If the urinalysis results suggest a UTI (positive leukocyte esterase test results or nitrite test or microscopic analysis results positive for leukocytes or bacteria), then a urine specimen should be obtained through catheterization or SPA and cultured;
	B - For patients younger than 2 years or who cannot control urination, with suspected UTI, it is recommended to start antibiotic treatment after collecting the urine culture sample if they have bacteriuria or positive nitrites in a reliable urine sample (collected by SPA or catheter).	When urgent microscopy is not available, a urine sample should be sent for microscopy and culture, and antibiotic treatment should be started.	if urinalysis of fresh (<1 hour since void) urine yields negative leukocyte esterase and nitrite test results, then it is reasonable to monitor the clinical course without initiating antimicrobial therapy, recognizing that negative urinalysis results do not rule out a UTI with certainty.
	B - For infants at risk of severe disease (with fever of unknown origin) younger than 2 years or who cannot control urination, it is recommended to start antibiotic treatment after collecting the urine culture sample if they have bacteriuria or positive nitrites or leukocyturia in a reliable urine sample (collected by SPA or catheter).	When urgent microscopy is not available, dipstick testing may act as a substitute. The presence of nitrites suggests the possibility of infection and antibiotic treatment should be started (see table 4). In all cases, a urine sample should be sent for microscopy and culture.	To establish the diagnosis of UTI, clinicians should require *both* urinalysis results that suggest infection (pyuria and/or bacteriuria) *and* the presence of at least 50 000 colony-forming units (CFUs) per mL of a uropathogen cultured from a urine specimen obtained through catheterization or SPA (evidence quality: C; recommendation).
	B - In patients older than 2 years with suspected UTI who can control urination, it is recommended to perform a urine dipstick test. Perform a microscopic examination of urine, if available, only in dubious cases.	if both leucocyte esterase and nitrites are positive- regard as having UTI	.

	B - In patients older than 2 years with a high clinical suspicion of UTI (specific symptoms with the presence of nitrites or bacteriuria, with or without leukocytes), it is recommended to start empirical antibiotic treatment after collecting the urine culture.	if leucocyte esterase is negative and nitrites is postive, Abx treatment should be started is test is fresh and sample should be sent for culture, subsequent management depends on culture	.
	B - In patients older than 2 years, with leukocytes only in urine, it is recommended to perform a urine culture, and consider starting antibiotic treatment depending on the likelihood of symptoms and the patient's clinical situation.	if leucocyste esterase is positive and nitrites is negative, urine sample should be sent for microscopy and culture. Antibiotics should not be started unless there is good evidence of UTI	.
	B - Do not treat or perform a urine culture on patients older than 2 years if no leukocytes or nitrites are found in the urine sample and clinical features are non-specific.	if both leucocyte esterase and nitrites are negative- should not regard as having UTI	.
	GCP - It is recommended to confirm UTI by urine culture when available. It is especially necessary in the following cases:	if microscopy show pyuria and bacteriuria positive- should be regarded as having UTI	.
	Children under 2 years or those who cannot control urination	if pyuria positive and bacteriuria negative, antibiotics should be started if clinically UTI	.
	Where there is suspicion of upper tract UTI	If pyuria negative and bacteriuria positive should be regarded as having uti	.
	In any patient at risk of serious illness	if both pyuria and bacteriuria negative, should be regarded as not having UTI	.
	In any patient, when the dipstick results are inconclusive or do not agree with the clinical examination	Urine samples should be sent for culture: • in infants and children who have a diagnosis of 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 and children under 3 years • in infants and children with a single 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.	.
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Blood test and other tests	C - Suspect APN with high acute phase reactants C-reactive protein (CRP) and/or procalcitonin (PCT), especially the latter.	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.	None discussed
	C - Suspect APN with interleukin-6 (IL-6) in urine >15 pg/mL.	.	.

	GCP - Suspect APN with a defect in renal concentrating ability, i.e., reduced maximum urine osmolality checked by an appropriate diagnostic test.	.	.
	B - If there are no symptoms and/or clinical signs (fever, abdominal pain or malaise) with normal or slight increase in acute phase reactants (CRP <20 mg/L, PCT <0.5 ng/mL, erythrocyte sedimentation rate [ESR] <10 mm/h and/or IL-6 in serum <4 pg/mL) or normal spontaneous osmolality, do not suspect renal parenchymal involvement.	.	.
Diagnostic Imaging	GCP - It is recommended to perform a urinary tract ultrasound after a first UTI if any of the following criteria apply to the patient: Febrile UTI, No control over urination, and with no pre-natal or normal post-natal ultrasound, Signs of urinary tract dysfunction, Abdominal or bladder mass, High creatinine levels, UTI from a microorganism other than Escherichia coli	The routine use of imaging in the localisation of a UTI is not recommended.	Febrile infants with UTIs should undergo renal and bladder ultrasonography (RBUS) (evidence quality: C; recommendation).
	C - It is recommended to perform an ultrasound of the urinary tract in all children with recurrent UTI.	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.	VCUG should not be performed routinely after the first febrile UTI; VCUG is indicated if RBUS reveals hydronephrosis, scarring, or other findings that would suggest either high-grade VUR or obstructive uropathy, as well as in other atypical or complex clinical circumstances (evidence quality B; recommendation).
	C - It is recommended to use techniques enhancing the ultrasound of the urinary tract, if available.	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 6, 7 and 8. This is to ensure prompt management.	Further evaluation should be conducted if there is a recurrence of febrile UTI (evidence quality: X; recommendation).
	D - Do not perform routine renal scintigraphy with technetium-labelled dimercaptosuccinic acid (99mTc-m) (DMSA) in the acute phase for patients with UTI.	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 6.	.
	GCP - Consider selective use of DMSA in the acute phase, if available, if the result is important for the subsequent diagnosis of the patient (e.g., to decide treatment or complementary tests).	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 7 and 8.	.
	D - It is recommended to perform delayed DMSA scintigraphy (after 6 months) after a first febrile UTI if any of the following criteria apply to the patient: Atypical evolution (persistence of fever >48 hours), Signs of lower urinary tract dysfunction, Abdominal or bladder mass, High creatinine levels, Septicaemia UTI from a microorganism other than E. coli Pathological findings in previous imaging studies (e.g., ultrasound, cystogram, DMSA)	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.	.

	GCP - Consider delayed DMSA scintigraphy (after 6 months) after a first febrile UTI if clinical, laboratory or radiological findings indicate a high likelihood of renal involvement.	A DMSA scan 4–6 months following the acute infection should be used to detect renal parenchymal defects, as outlined in tables 6, 7 and 8.	.
	C - It is recommended to perform DMSA scintigraphy on paediatric patients with recurrent febrile UTI.	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.	.
	D - In general, it is not recommended to perform cystography (voiding cystourethrogram [VCUG], radionuclide cystography or echo-enhanced cystography) on children after a first UTI, unless any of the following criteria apply to the patient: Recurrent UTI, Abnormalities in previous imaging studies (ultrasound or DMSA), Signs of lower urinary tract dysfunction, Family history of vesicoureteral reflux (VUR)	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 6, 7 and 8.	.
	C - When performing a cystographic study in paediatric patients, it is recommended to use radionuclide cystography or echo-enhanced cystography, if available, instead of VCUG, unless lower urinary tract abnormalities are suspected.	When a micturating cystourethrogram (MCUG) is performed, prophylactic antibiotics should be given orally for 3 days with MCUG taking place on the second day.	.
	.	Infants and children who have had a UTI should be imaged as outlined in tables 6, 7 and 8.	.
Referral to Specialist/ Hospitalization	GCP - A child with febrile urinary tract infection meeting any of the following criteria should be admitted to hospital:	Infants and children with a high risk of serious illness should be referred urgently to the care of a paediatric specialist.	.
	Age less than 3 months old	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 ‘Feverish illness in children’ (NICE clinical guideline 47).	.
	Affectation of the general condition, sickly appearance	For infants and children 3 months or older with acute pyelonephritis/upper urinary tract infection consider referral to a paediatric specialist	.
	Vomiting or oral intolerance	.	.
	Dehydration, poor peripheral perfusion	.	.
	Urinary system malformations: VUR, obstructive uropathy, renal dysplasia, single kidney	.	.
	Poor care or trouble monitoring	.	.
	Primary or secondary immunodeficiency	.	.
	Electrolyte or renal function abnormalities	.	.
	GCP - Refer patients from primary care to specialist care if they meet any of the following criteria:	.	.
	• Febrile urinary tract infection and/or UTI in children under 2 years or in patients who cannot control urination and	.	.

	cannot be completely	.	.
	• investigated in primary care	.	.
	• Recurrent UTIs	.	.
	• Atypical UTI: fever >48 hours, unusual bacteria	.	.
	• Structural abnormalities, single kidney and/or nephrourological functional abnormalities	.	.
	• Permanent kidney damage confirmed by imaging studies or blood markers (urea, creatinine, cystatin C) or urine (proteinuria, maximum	.	.
	• urinary osmolality)	.	.
	• Hypertension	.	.
	• Failure to thrive	.	.
	• Family history of nephrourologic disease and/or chronic kidney disease (CKD)	.	.
	• Anxious family and/or diagnostic confirmation	.	.
Acute Management	GCP - It is recommended to start early antibiotic treatment at the first suspicion of febrile UTI, as delaying the onset of antibiotic therapy in febrile UTI cannot be justified on safety grounds.	For infants and children 3 months or older with acute pyelonephritis/upper urinary tract infection treat with oral antibiotics for 7–10 days. The use of an oral antibiotic with low resistance patterns is recommended, for example cephalosporin or co-amoxiclav . if oral antibiotics cannot be used, treat with an intravenous (IV) antibiotic agent such as cefotaxime or ceftriaxone for 2–4 days followed by oral antibiotics for a total duration of 10 days.	When initiating treatment, the clinician should base the choice of route of administration on practical considerations. Initiating treatment orally or parenterally is equally efficacious. The clinician should base the choice of agent on local antimicrobial sensitivity patterns (if available) and should adjust the choice according to sensitivity testing of the isolated uropathogen (evidence quality: A; strong recommendation).
	A - Oral administration is the recommended route of choice for antibiotic treatment of children with febrile UTI without known obstructive urological disease and no symptoms of a serious infection.	For infants and children 3 months or older with cystitis/lower urinary tract infection treat with oral antibiotics for 3 days. The choice of antibiotics should be directed by locally developed multidisciplinary guidance. Trimethoprim, nitrofurantoin, cephalosporin or amoxicillin may be suitable. the parents or carers should be advised to bring the infant or child for reassessment if the infant or child is still unwell after 24–48 hours. If an alternative diagnosis is not made, a urine sample should be sent for culture to identify the presence of bacteria and determine antibiotic sensitivity if urine culture has not already been carried out.	The clinician should choose 7 to 14 days as the duration of antimicrobial therapy (evidence quality: B; recommendation).
	GCP - Intravenous (IV) antibiotic administration is recommended in children with suspected obstructive uropathy or high-grade VUR (IV–V), signs of septicaemia, uncontrollable vomiting or dehydration.	For infants and children who receive aminoglycosides (gentamicin or amikacin), once daily dosing is recommended.	Further evaluation should be conducted if there is a recurrence of febrile UTI (evidence quality: X; recommendation).

	A - If antibiotic treatment is started intravenously, it is recommended to continue with oral administration when the patient's clinical condition allows it.	If parenteral treatment is required and IV treatment is not possible, intramuscular treatment should be considered.	After confirmation of UTI, the clinician should instruct parents or guardians to seek prompt medical evaluation (ideally within 48 hours) for future febrile illnesses,to ensure that recurrent infections can be detected and treated promptly (evidence quality: C; recommendation).
	GCP - Clinically evaluate the patient after approximately 48 hours of antibiotic treatment by any route of administration.	If an infant or child is receiving prophylactic medication and develops an infection, treatment should be with a different antibiotic, not a higher dose of the same antibiotic	The optimal duration of antimicrobial treatment has not been determined. RCTs of head-to-head comparisons of various duration would be valuable, enabling clinicians to limit antimicrobial exposure to what is needed to eradicate the offending uropathogen.
	GCP - The choice of empirical antibiotic treatment for UTI must be based on knowledge of local resistance.	.	.
	GCP - At present in Spain, for empirical antibiotic treatment of UTI without fever seems appropriate to use amoxicillin-clavulanate, 1st or 2nd generation cephalosporins, fosfomycin, nitrofurantoin or trimethoprim-sulfamethoxazole (TMP-SMX) if the sensitivity information provided by local laboratory permits.	.	.
	GCP - At present in Spain, for oral (PO) empirical antibiotic treatment of UTI with fever it seems appropriate to use 3rd generation cephalosporins, and as an alternative amoxicillin-clavulanate or 2nd generation cephalosporins (if sensitivity is greater than 80% to 90% for E. coli).	.	.
	GCP - At present in Spain, for IV empirical treatment of UTI with fever it seems appropriate to use 3rd generation cephalosporins IV (cefotaxime, ceftriaxone) or as an alternative an aminoglycoside (gentamicin, tobramycin), amoxicillin-clavulanate IV or 2nd generation cephalosporins IV. Other 3rd generation cephalosporins, such as ceftazidime, and other antibiotics such as amikacin, carbapenems and quinolones should be reserved for special circumstances.	.	.
	GCP - At present in Spain, for patients younger than 3 months open to the possibility of infection with enterococci, associate ampicillin to th recommended treatment base.	.	.
	A - It is recommended to administer aminoglycosides in a single daily dose when required for the treatment of febrile UTI in children.	.	.
	A - The recommended antibiotic treatment duration for afebrile UTI/cystitis is 3 to 4 days.	.	.
	GCP - The recommended antibiotic treatment duration for febrile UTI/APN is a standard duration of 7 to 10 days.	.	.

	GCP - As treatment of choice for acute lobar nephronia (ALN) and renal abscess it is recommended to use 2 antibiotics, chosen according to local sensitivities, initially administered intravenously then orally (PO) after clinical improvement.	.	.
	D - The recommended antibiotic treatment duration for ALN and renal abscess is 2 to 3 weeks.	.	.
	No studies were found of a suitable design, with good methodological quality, or had an appropriate study population or relevant come variables to be able to answer the question posed in this section.	.	.
Long Term management	A - Antibiotic prophylaxis should not be routinely given to children who have had a single UTI.	Dysfunctional elimination syndromes and constipation should be addressed in infants and children who have had a UTI.	The presumption that antimicrobial prophylaxis is of benefit for individuals with VUR to prevent recurrences of UTI or the development of renal scars is not supported by the aggregate of data from recent studies. E
	A - Antibiotic prophylaxis should not be given to children with asymptomatic bacteriuria (ABU).	Children who have had a UTI should be encouraged to drink an adequate amount.	ffectiveness of antimicrobial prophylaxis for the prevention of UTI has not been demonstrated, the concept has biological plausibility.
	GCP - For children with recurrent UTI, it is recommended to evaluate the use of prophylactic antibiotics individually after appropriate study to rule out structural or functional abnormalities of the urinary tract, and taking into account the existence of resistant strains.	Children who have had a UTI should have ready access to clean toilets when required and should not be expected to delay voiding.	Barriers to the effectiveness of antimicrobial prophylaxis are adherence to a daily regimen, adverse effects associated with the various agents, and the potential for emergence of antimicrobial resistance.
	GCP - It is recommended to take into account local resistance patterns when proposing prophylactic treatment, and try to select antibiotics with a narrower spectrum of action to prevent the upper airway bacteria from developing resistance to them.	Antibiotic prophylaxis should not be routinely recommended in infants and children following first-time UTI.	A urinary antiseptic, rather than an antimicrobial agent, would be particularly desirable, because it could be taken indefinitely without concern that bacteria would develop resistance. Another possible strategy might be the use of probiotics.
	GCP - Taking into account the above recommendation, it is recommended to use TMP or TMP-SMX in patients older than 2 months of age, and	Antibiotic prophylaxis may be considered in infants and children with recurrent UTI.	.
	nitrofurantoin in patients older than 2 to 3 years, as the use of prophylactic antibiotics or antiseptics cannot be prioritised due to the lack of available evidence.	Asymptomatic bacteriuria in infants and children should not be treated with prophylactic antibiotics.	.
	GCP - In children under 2 months of age, or in any situation where nitrofurantoin or TMP or TMP-SMX cannot be used, it is recommended to use as prophylactic antibiotic amoxicillin or 1st or 2nd generation cephalosporins.	.	.

	Nitrofurantoin: 1–2 mg/kg/day, TMP-SMX: 2–3 mg/kg/day (of trimethoprim), Trimethoprim: 2–3 mg/kg/dayGCP - Recommended prophylactic doses are as follows:	Surgical management of VUR is not routinely recommended.	.
	B - It is recommended to use antibiotic prophylaxis in girls with VUR grades III–V for 1 year or until the degree of VUR is re-evaluated by cystographic examination.	Infants and children who do not undergo imaging investigations should not routinely be followed up.	.
	GCP - It is recommended to use antibiotic prophylaxis in boys with VUR grades IV–V for 1 year or until the degree of VUR is re-evaluated by cystographic examination.	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.	.
	A - It is not recommended to use antibiotic prophylaxis neither in boys with VUR grades I–III nor in girls with VUR grades I–II.	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.	.
	C - It is recommended to use antibiotic prophylaxis in paediatric patients with dilated urinary tract and suspected obstruction until the diagnosis is confirmed and proper treatment for the obstruction is given.	Infants and children who have recurrent UTI or abnormal imaging results should be assessed by a paediatric specialist.	.
	GCP - It is not recommended to use antibiotic prophylaxis for non-obstructive dilatations of the urinary tract.	Assessment of infants and children with renal parenchymal defects should include height, weight, blood pressure and routine testing for proteinuria.	.
	GCP - There was insufficient scientific evidence to support a recommendation for the use of any of the following preventive measures: vaccines with uropathogenic strains, ascorbic acid, cranberry juice or probiotics.	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.	.
	C - Preventive measures aimed at reducing recurrences of UTI should be tailored according to the pattern of urinary tract dysfunction or urinary habits of the patient, and directed to achieve adequate fluid intake.	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.	.
	D - It is recommended to investigate and address any constipation in children with UTI and/or signs of lower urinary tract dysfunction to prevent recurrence of UTI.	Infants and children who are asymptomatic following an episode of UTI should not routinely have their urine re-tested for infection.	.
	.	Asymptomatic bacteriuria is not an indication for follow-up.	.
	C - Following a first UTI, monitor patients with a normal urinary tract, especially boys under 12 months of age with a non-retractable foreskin, during the first year of evolution, as they have frequent recurrences.	.	.
	D - Investigate voiding and bowel habits in children with UTI for their possible association with recurrent UTI.	.	.

	D - It is not recommended to perform urine culture and/or systematic analysis during antibiotic treatment in children with UTI if the clinical course is favourable.	.	.
	D - It is not recommended to perform regular culture and/or systematic analyses of urine in asymptomatic children after UTI.	.	.
	D - It is not recommended to perform regular culture and/or systematic analyses of urine in asymptomatic children with structural and/or functional abnormalities.	.	.
	Q - If UTI is suspected or diagnosed, it is recommended to inform the family, carers or patient (depending on age) about the need for early antibiotic treatment and the importance of completing it.	.	.
	Q - It is recommended to warn of the possibility of recurrence and advise about appropriate preventive hygiene measures. Give guidance for recognising UTI symptoms (fever of unknown origin and urinary symptoms), and the need to seek medical advice if they appear.	.	.
	D - It is recommended to give instructions on the collection of the urine sample and its preservation until the time of the test.	.	.
	Q - It is recommended to inform about the prognosis, especially the risk of kidney damage and about the reasons for clinical monitoring and/or long-term treatment when required.	.	.
	Q - It is recommended to inform about the scans to be performed, the reasons for them and what they consist of.	.	.
	GCP - It is recommended to determine blood pressure (BP), plasma creatinine (PCr), glomerular filtration rate, proteinuria, microalbuminuria, alpha-1-microglobulin and maximum osmolality urine as markers of kidney damage and/or indicators of progression.	.	.
	GCP - In children with permanent, bilateral and severe (Goldraich type 3–4) kidney damage, it is recommended to test with a dipstick and determine the BP every 6 months, or annually for children with unilateral or mild affectation (Goldraich type 1–2).	.	.
	GCP - Follow the centre protocol for monitoring patients with impaired renal function. In case of impaired renal function it is recommended to follow the patient according to the centre protocol.	.	.

	GCP - It is not recommended to routinely use ambulatory blood pressure monitoring (ABPM) in children with permanent kidney damage and no alteration in renal function, as its prognostic value is not clearly demonstrated.	.	.
	GCP - Do not routinely use plasma renin levels as a prognostic marker for hypertension (HT) in children with permanent kidney damage.	.	.
	GCP - Boys with permanent kidney damage require further monitoring of renal function and BP in adolescence.	.	.
	GCP - Give pregnant adolescents with renal disease regular check-ups for the early detection of bacteriuria and foetal/maternal complications (e.g., BP abnormalities, impaired renal function, intra-uterine growth retardation, foetal loss or premature birth).	.	.
	GCP - It is recommended to use prophylactic antibiotics to prevent UTI in children with a temporary urinary catheter after hypospadias repair urethral surgery.	.	.
	GCP - It is recommended to use prophylactic antibiotics to prevent UTI in children with a temporary urinary catheter after vesicourethral surgery.	.	.
	GCP - It is not recommended to use antibiotic prophylaxis in children with a temporary urinary catheter for non-surgical reasons.	.	.
	GCP - It is not recommended to use antibiotic prophylaxis in paediatric patients under a clean intermittent catheterisation regimen.	.	.
	GCP - It is not recommended to give routine antibiotic prophylaxis to children prior to diagnostic procedures requiring a single catheterisation (cystoscopy, VCUG, CEUS, urodynamics, urine sampling).	.	.
	GCP - Antibiotic prophylaxis may be considered when there is a risk from related illnesses (e.g., heart disease), recurrent UTI, atypical UTI, suspected VUR grade IV–V or abnormalities.	.	.
Predicting the Risk of Chronic Kidney Damage	B - It is recommended to investigate renal injury in paediatric patients with VUR, as they present an increased risk of permanent injury.	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	.

	B - It is recommended to investigate the presence of permanent renal damage in paediatric patients with recurrent febrile UTI.	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.	.
	B - An increase in acute phase reactants or renal ultrasound during febrile UTI, in isolation, should not be used as predictors of permanent kidney damage.	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.	.
	D - It is not recommended to investigate permanent renal damage by renal scintigraphy in paediatric patients with a first febrile UTI, based on the clinical presentation, delay in establishing treatment, patient's age or gender.		. . . . .