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تلفن های تماس با دبیرخانه علمی کنگره
۰۹۱۷۹۷۲۸۰۱۷ - ۳۶۴۷۴۹۸ (۰۷۱)
تلفن های تماس با دبیرخانه اجرایی کنگره
۰۹۱۷۰۴۵۷۵۳۹ - ۹۱۷۵۶۷۹۲۸۳

مجری برگزاری: **زوسپا**

Illness episodes in children <5 years

والدین دفتر ۱۵ ماهه ای اظهار میکنند ازدو روز قبل دچار تب و بی قراری شده است. در معاینه بیقرار است پرده تمپان یک طرف مختصری اریتماتو و سایر معاینات نرمال است

T=39 Axilla,RR=28



- در چه کودکانی آزمایش ادرار و کشت درخواست کنیم؟

AAP recommendations

The recommendation differs from the previous AAP guideline, which recommended urine testing for all children aged 2–24 months with unexplained febrile illness

Nelson 2024

Among children 2-24 months of age, risk factors for UTI include age < 12 months, being a female or uncircumcised male, $T \geq 39^{\circ}\text{C}$, **fever for at least 2 days**, and absence of another source of infection.

~~**race**~~

□ کودک 15 ماهه ای با وزن 10kg بعلت تب از سه روز قبل به شما مراجعه میکند
بجز تب سایر معاینات نرمال است برای او آزمایش درفواست می کنید که نتایج آن
به شرح ذیل است . روز بعد تب بیمار قطع میشود و حال عمومی او خوب است.

- *U/A normal*
- *U/C via catheter: E. coli 50,000*





- اساس تفسیر آنالیز تست ادرار را توضیح دهید؟

FRESH is BEST!

- *If sample is not to be read within 30 minutes, then refrigerate*
- *If sample has been refrigerated, allow to warm to room temperature prior to analysis*

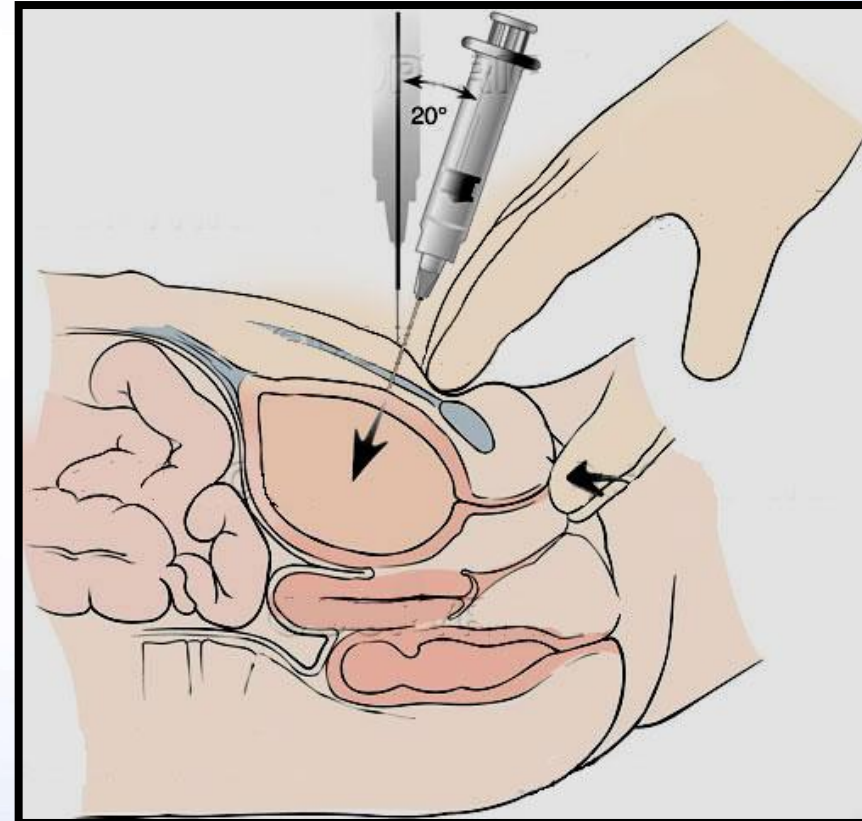
(will correct any changes in pH or sp gravity that occur with refrigeration)

10 changes may occur if urine is allowed >1h at room temperature

- 1. increased **pH** from the breakdown of urea to ammonia by urease-producing bacteria
- 2. decreased glucose due to glycolysis and bacterial utilization
- 3. decreased ketones because of volatilization
- 4. decreased bilirubin from exposure to light
- 5. decreased urobilinogen by its oxidation to urobilin
- 6. increased **nitrite** due to bacterial reduction of nitrate
- 7. increased **bacteria**
- 8. increased **turbidity** caused by bacterial growth and possible precipitation of amorphous material
- 9. **disintegration** of RBC's and casts, particularly in dilute alkaline urine
- 10. changes in color due to oxidation or reduction of metabolites

Specimen Collection

Suprapubic Needle Aspiration



Which result are more likely to indicate UTI?.

A

- WBC 3-5
- RBC 2-4
- SG 1015
- Bacteria few
- Nitrite ++
- RBC 2-4

B

- WBC 15-20
- RBC 2-4
- SG 1015
- Bacteria many
- Nitrite Neg
- RBC 0-2

C

- WBC 12-15
- RBC 2-4
- SG 1005
- Bacteria many
- Nitrite Neg
- RBC 2-4

D

- WBC 12-15
- RBC 2-4
- SG 1030
- Bacteria Rare
- Nitrite ++
- RBC 0-2

Leucocyte Esterase

Results from the presence of white blood cells either as whole cells or as lysed cells



Not always indicative of infection

- Vaginitis/vulvitis can lead to inflammation without infection → + LE

10-25 WBC/ μ l

FP:

Nitrofurantoin, beet root

FN:

pr > 500mg/ml, glucose, gentamycin, cephalosprin



Nitrite



Negative



Positive

- Indicates that bacteria may be present in significant numbers in urine
- Nitrates from diet get converted to nitrites by some bacteria in the urine
 - NB not all bacteria produce nitrites
 - Nitrites are produced by bacteria that metabolize nitrates: **E. coli**, Klebsiella, Proteus (GNRs)
 - Much more predictive of UTI
 - GPCs do not produce nitrites
- $\geq 10^5/\mu\text{l}$ bacteria
- $\geq 4\text{h}$ in bladder
- Sensitivity of the nitrite test versus quantitative urine culture is only about 50%
- FP: Beetroot, phenazopyridine, **late analysis, macroscopic hematuria**
- FN: Ascorbic Acid

White blood cells

- may originate anywhere in the urinary tract
- Renal origin
 - accompanied by significant proteinuria
 - WBC casts*
 - WBCs in clumps
- Lower urinary tract
 - may be associated with slight proteinuria
- Pyuria suggests infection, but infection can occur in the absence of pyuria; this finding is more confirmatory than diagnostic. Conversely, pyuria can be present without UTI.

Does This Child Have a Urinary Tract Infection?

Nelson

- If the child is asymptomatic and U/A is normal, it is unlikely that there is a UTI

Ped. nephrology

- *The diagnosis of UTI does not require the presence pyuria*

AAP

- UTI diagnosis require **both** U/A (pyuria and/or bacteriuria) *and positive U/C*

pretest probability

LR in UTI Diagnosis

- N+LE
- N or LE
- N+LE
- Bact.+ WBC
- Bact.+ WBC



- LR[+]=28
- LR[-]=6
- LR[-]=0.2
- LR[+]=37
- LR[-]=0.1

significant pyuria

- At least 10 white blood cells per microliter from an unspun specimen examined using a counting chamber or at least 5 WBC HPF from a centrifuged specimen

significant bacteriuria

- Any organisms from a suprapubic specimen,
- at least 50 000 CFUs/mL from a catheterized specimen,
- at least 100 000 CFUs/mL from a clean-catch specimen

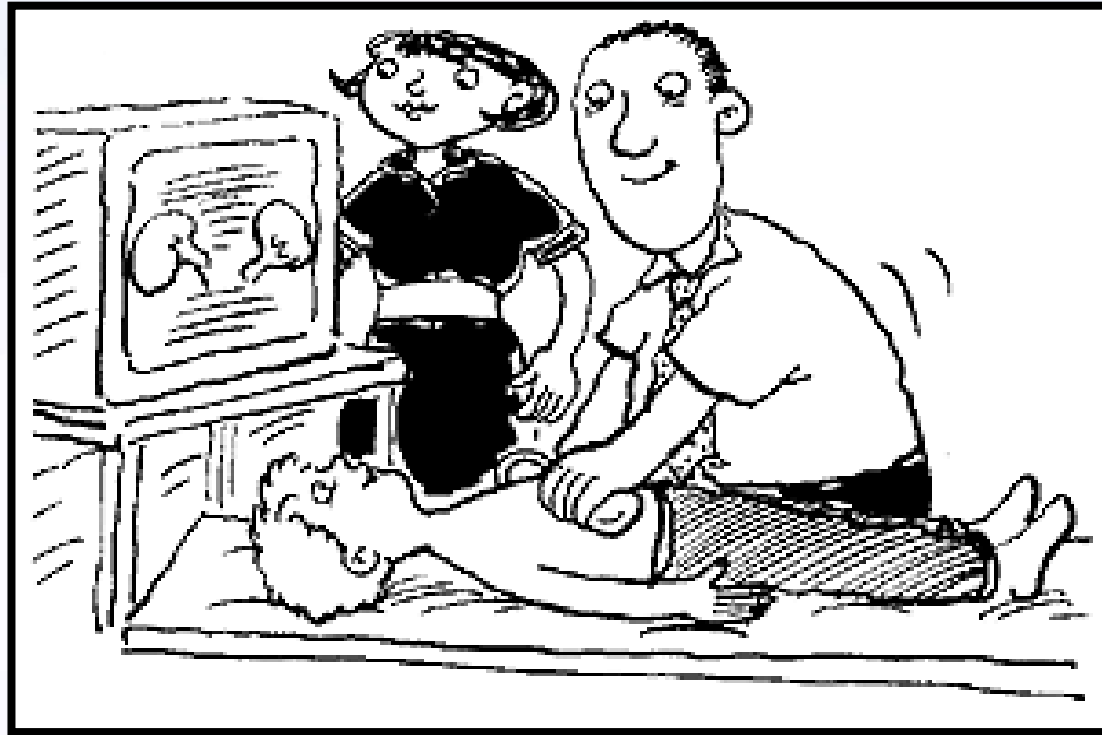
UTI

- The presence of significant bacteriuria and pyuria in a
- symptomatic child constitutes a UTI

Radiologic evaluation of UTI

□ کودک سه ساله ای با تب و استفراغ مکرر با تشخیص اولین عفونت ادراری تب دار تمت درمان است . کدام روش تصویر برداری ضروری است





✓ AAP CPG:

Nonspecific RBUS findings, such as mild renal pelvic or ureteral distention, are common and are not necessarily associated with reflux

Radiologic evaluation of UTI

If prophylaxis is, not beneficial and VUR is not required for development of pyelonephritis, then the rationale for performing VCUG routinely after an initial febrile UTI must be questioned

VCUG is indicated if

- ✓ RBUS reveals abnormality
- ✓ Atypical or complex clinical circumstances
- ✓ recurrence of febrile UTI

Radiologic evaluation of UTI-Nelson 2024

Table 575.3 Guideline Recommendations for Diagnostic Evaluation Following a Febrile Urinary Tract Infection in Infants

GUIDELINE	ULTRASONOGRAPHY	VCUG	LATE DMSA SCAN
National Institute for Health and Care Excellence (NICE)	See Table 575.4		
American Academy of Pediatrics (retired)	Yes	If abnormal ultrasonogram or febrile recurrence	No
Italian Society for Paediatric Nephrology (ISPN)	Yes	If abnormal ultrasonogram, non- <i>Escherichia coli</i> infection, or febrile recurrence	If grade IV-V VUR
Spanish Association of Paediatrics	Yes, if age <6 months, atypical infection,* or recurrence	If abnormal ultrasonogram, atypical infection,* or recurrence	If atypical infection* or recurrence
Swiss consensus recommendations	Yes	If abnormal ultrasonogram, atypical infection, [†] or febrile recurrence	No

*Defined as fever >48 hours after appropriate antibiotics, sepsis, non-*E. coli* infection, acute kidney injury, or abdominal or vesical mass.

[†]Defined as failure to respond to appropriate antibiotics within 48 hours, non-*E. coli* infection, increased creatinine, abnormal electrolytes, hypertension, or poor urine flow. VCUG, Voiding cystourethrogram; DMSA, dimercaptosuccinic acid; VUR, vesicoureteral reflux.

Table 575.4 NICE Recommended Imaging Schedule for Children with Urinary Tract Infection

CHILD AGE AND TESTS	TYPE OF INFECTION		
	RESPONDS WELL TO TREATMENT WITHIN 48 HR	ATYPICAL INFECTION*	RECURRENT INFECTION
CHILDREN YOUNGER THAN 6 MO OLD			
Ultrasound scan during acute infection	No	Yes	Yes
Ultrasound scan within 6wk of infection	Yes	No	No
DMSA scan 4-6mo after acute infection	No	Yes	Yes
VCUG	Consider if ultrasound scan abnormal	Yes	Yes
CHILDREN 6 MO TO YOUNGER THAN 3 YR OLD			
Ultrasound scan during acute infection	No	Yes	No
Ultrasound scan within 6wk of infection	No	No	Yes
DMSA scan 4-6mo after acute infection	No	Yes	Yes
VCUG	No	Not routine; consider if dilation on ultrasound, poor urine flow, non- <i>E. coli</i> infection, or family history of vesicoureteral reflux	
CHILDREN 3 YR OR OLDER			
Ultrasound scan during acute infection	No	Yes	No
Ultrasound scan within 6wk of infection	No	No	Yes
DMSA scan 4-6mo after acute infection	No	No	Yes
VCUG	No	No	No

*Defined as seriously ill, poor urine flow, abdominal or bladder mass, raised creatinine, sepsis or bacteriemia, failure to respond to appropriate antibiotics within 48 hours, or infection with non-*E. coli* organisms.

NICE, National Institute for Health and Care Excellence; DMSA, Dimercaptosuccinic acid; VCUG, voiding cystourethrogram.

Adapted from National Institute for Health and Clinical Excellence. Urinary tract infection in children: Diagnosis, treatment, and long-term management. NICE clinical guidelines, no. 224. London: RCOG Press; 2022. Tables 4-6.

Box 1 Definitions of atypical and recurrent UTI

Atypical UTI includes:

- seriously ill (for more information refer to [Feverish illness in children](#) [NICE clinical guideline 47])
- 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:

- two or more episodes of UTI with acute pyelonephritis/upper urinary tract infection, or
- one episode of UTI with acute pyelonephritis/upper urinary tract infection plus one or more episode of UTI with cystitis/lower urinary tract infection, or
- three or more episodes of UTI with cystitis/lower urinary tract infection.

Atypical UTI features (*nelson 2024*)

- Treatment failure within 48-72 hours of appropriate antibiotics
- Poor urine flow
- An abdominal, flank, or suprapubic mass
- Sepsis
- An elevated creatinine level



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- VCUG and DMSA scans are associated with significant radiation
- both equivalent to 40–50 chest X-rays or 4 months of natural background radiation

Criteria for positive UC in children

A positive urinalysis suggestive of infection (i.e., presence of pyuria) plus a urine culture with $\geq 50,000$ CFU/mL of a single uropathogen are recommended for diagnosis of a UTI in a symptomatic child

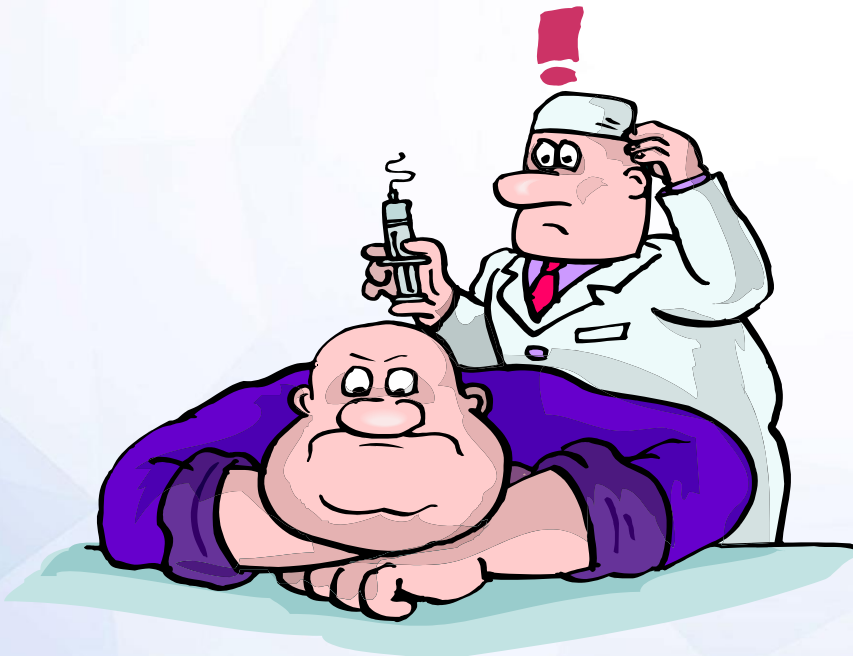
UTI-Nelson 2024

Criteria for positive UC in children

In the appropriate clinical context, $\geq 10,000$ CFU/mL may be sufficient for diagnosis, especially if the laboratory does not categorize counts between 10,000 and 100,000 CFU/mL

UTI-Nelson 2024

□ برای درمان اولیه عفونت ادرای دختر / پسر دوساله که از سه روز قبل تب دارد و U/A فعال دارد قبل از آماده شدن نتایج کشت کدام رژیم درمانی را پیشنهاد میکنید؟



Treatment Acute cystitis (*nelson 2024*)

- Acute cystitis should be treated promptly to prevent possible progression to pyelonephritis.
- If the symptoms are **severe**, and the urinalysis shows **pyuria**, presumptive treatment should be started while awaiting urine culture results.
- If the symptoms are mild or the diagnosis is doubtful, treatment can be delayed until the results of culture are known, and the urinalysis and culture can be repeated if the results are uncertain.

Treatment Acute febrile UTI (*nelson 2024*)

- Parenteral therapy should be used in children who are dehydrated, are vomiting, are unable to drink fluids, have complicated infection, or in whom urosepsis is a possibility.
- **Infants <1 month** of age with suspected febrile UTI are typically hospitalized and started on parenteral antibiotics while awaiting results of a sepsis evaluation and can be converted to oral therapy if there is no concern for meningitis and they are otherwise clinically well.
- Infants **1-2 months** of age can be managed as an outpatient unless hospitalization is indicated for other reasons (e.g., emesis, dehydration).

Treatment Acute febrile UTI (*nelson 2024*)

- Local antimicrobial sensitivity patterns should be considered when selecting empiric antibiotic treatment.
- Cephalexin
- Oral third-generation cephalosporins such as cefixime
- Trimethoprim-sulfamethoxazole (TMP-SMX)
- Nitrofurantoin (except for febrile UTI)
- Oral fluoroquinolone (ciprofloxacin)

Treatment Acute febrile UTI (*nelson 2024*)

- For parenteral treatment in *hospitalized children* $\geq 1mo$, ***ceftriaxone*** is a reasonable choice until culture results are available to determine whether a narrower-spectrum antibiotic can be used.
- ***Ampicillin + gentamicin*** or a ***third-generation cephalosporin*** are often used empirically in neonates.
- If prior urine culture results have grown resistant or atypical organisms, other antibiotic choices may be prudent on a case-by- case basis.



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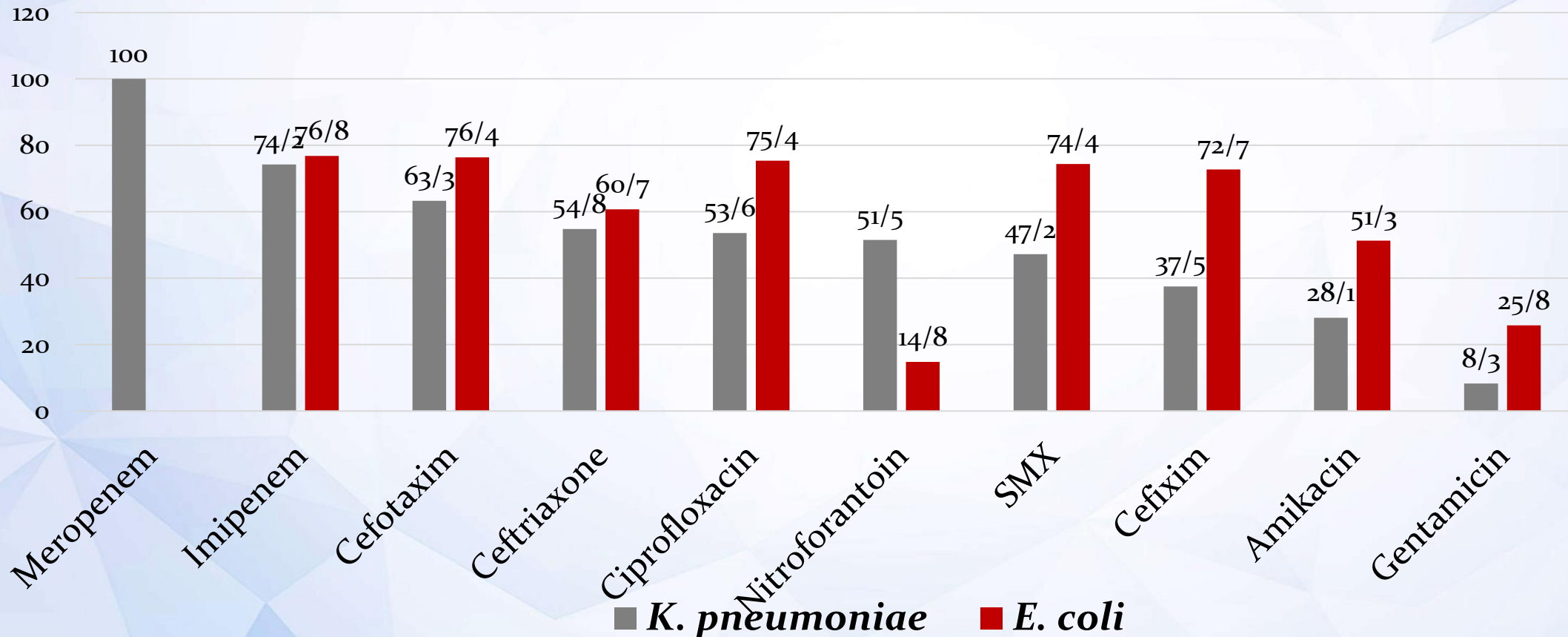
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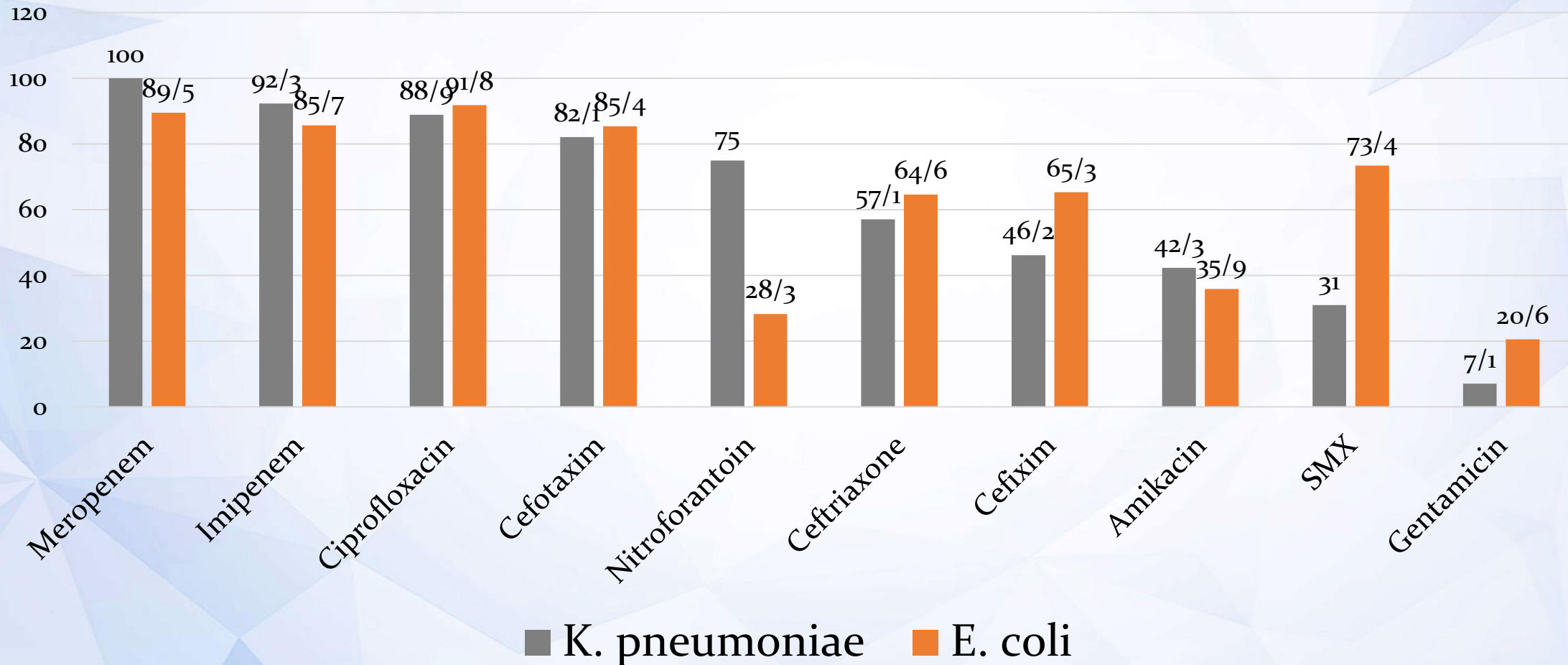
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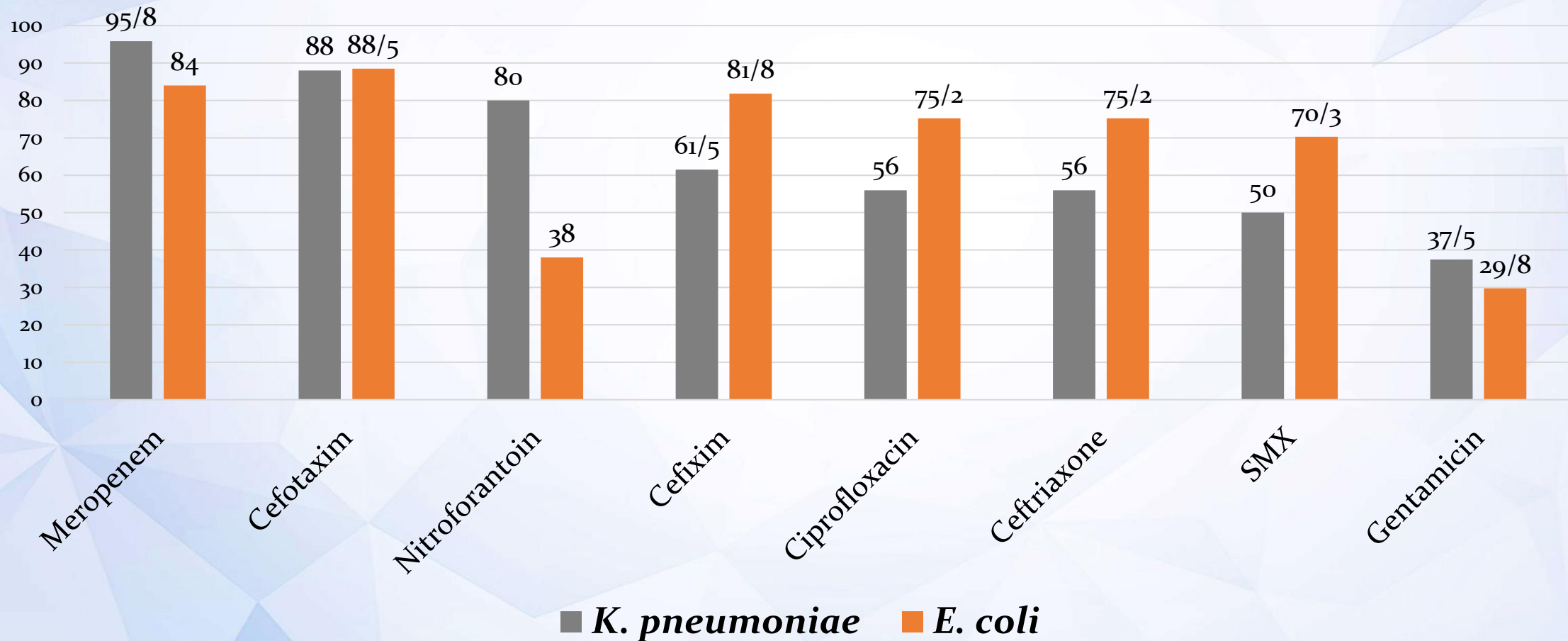
K. pneumoniae (37) versus E. coli (93) resistance pattern in spring 1402



K. pneumoniae (29) versus E. coli (102) resistance pattern in summer 1402



K. pneumoniae (26) versus E. coli (125) resistance pattern in autumn 1402



Follow up

- Periodic U/C ?
- Antibiotic prophylaxis?



Control urine culture (*nelson 2024*)

- A repeat urine culture after the termination of UTI treatment is not routinely needed.
- Urine cultures are typically negative within 24 hours of initiation of antibiotic therapy; therefore a urine culture during treatment is almost invariably negative.
- Most children exhibit clinical improvement (afebrile) within 48-72 hours of antibiotic initiation.
- Recommended duration of therapy is generally 3-5 days for cystitis and 7-10 days for uncomplicated pyelonephritis.

Treatment Acute febrile UTI (nelson 2024)

- Parenteral treatment with ceftriaxone or cefotaxime or ampicillin with an aminoglycoside **is preferable**.
- potential nephrotoxicity of aminoglycosides should be considered, and serum creatinine and AB levels must be obtained before initiating treatment, as well as daily thereafter.
- Aminoglycosides is particularly effective against *Pseudomonas spp*,
- **Alkalinization** of urine with sodium bicarbonate increases its effectiveness
- In some children intramuscular injection of a loading dose of ceftriaxone followed by oral therapy is effective.