

Urinary tract infections: choosing the right antibiotic tool for the job

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IDEXX



Disclosure:
Full-time Employee of IDEXX



The information contained herein is intended to provide general guidance only. As with any diagnosis or treatment you should use clinical discretion with each patient based on a complete evaluation of the patient, including history, physical exam and presentation, and laboratory data. With respect to any drug therapy or monitoring program, you should refer to a product insert, for complete description of dosage, indications, interactions, and cautions, Diagnosis, treatment, and monitoring should be patient specific and is the responsibility of the veterinarian providing primary care.

Objectives

- + Understand what is considered when reporting a positive urine culture and factors that can impact on interpretation of results
- + Understand the different components of Idexx urine culture microbiology reports, including interpretation of MICs
- + Familiarize with the current ISCAID recommendations for Urinary Tract Infections diagnosis and treatment
- + Through discussion of cases, understand why treatment options should take multiple factors into consideration, including patient factors that often cannot be captured simply on a microbiology report

Why this topic?

- + Common submission to the lab for culture and sensitivity
- + Clinical picture is not always clear and overlaps with cases that do not require antimicrobial therapy
- + Antimicrobial stewardship is a shared responsibility
- + Many times antimicrobial choice may be straight forward, but...
 - + Increased level of antimicrobial resistances
 - + Increased proportion of elderly patients with comorbidities
 - + Availability and secondary effects of antimicrobials may limit choices

Bacterial Cystitis – Clinical Signs

- Dysuria
- Stranguria
- Pollakiuria
- Haematuria



Factors that predispose or contribute to UTI or subclinical bacteriuria

Dogs

- Recessed vulva/perivulvar pyoderma
- Diabetes mellitus
- Hyperadrenocorticism
- Renal failure
- Urine catheters
- Ectopic ureters
- Micturition abnormalities
- Tube cystotomy
- Immunosuppression
- Urethrostomy
- Urolithiasis
- Urinary neoplasia

Cats

- Perineal urethrostomy
- Hyperthyroidism
- Diabetes mellitus
- CKD
- Micturition abnormalities
- Urine catheters
- Urolithiasis

What is Subclinical Bacteriuria?

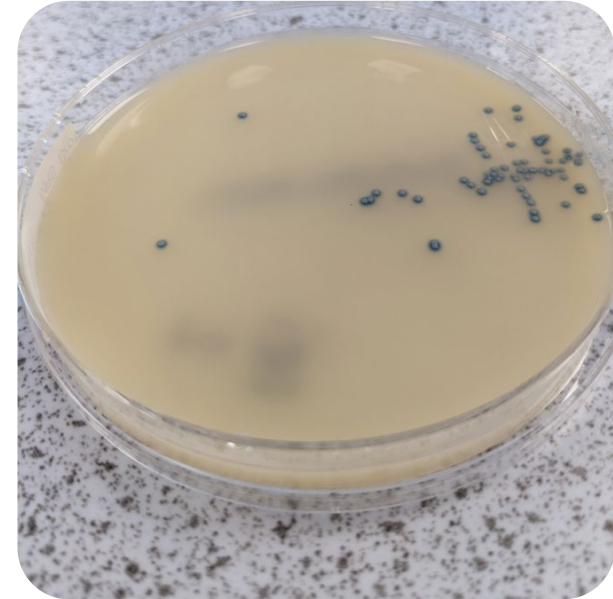
“Positive bacterial culture from a properly collected urine specimen, in the absence of clinical evidence of infectious urinary tract disease“

- Quantitative results cannot differentiate subclinical bacteriuria from bacterial cystitis
- Presence or absence of pyuria does not define subclinical bacteriuria

Weese JS, Blondeau J, Boothe D, Guardabassi LG, Gumley N, Papich M, Jessen LR, Lappin M, Rankin S, Westropp JL, Sykes J. International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats. *Vet J.* 2019 May;247:8-25. doi: 10.1016/j.tvjl.2019.02.008. Epub 2019 Feb 26. PMID: 30971357.

Bacterial Cystitis - Diagnosis

- Appropriate clinical signs
- Urinalysis
- Urine culture by cystocentesis

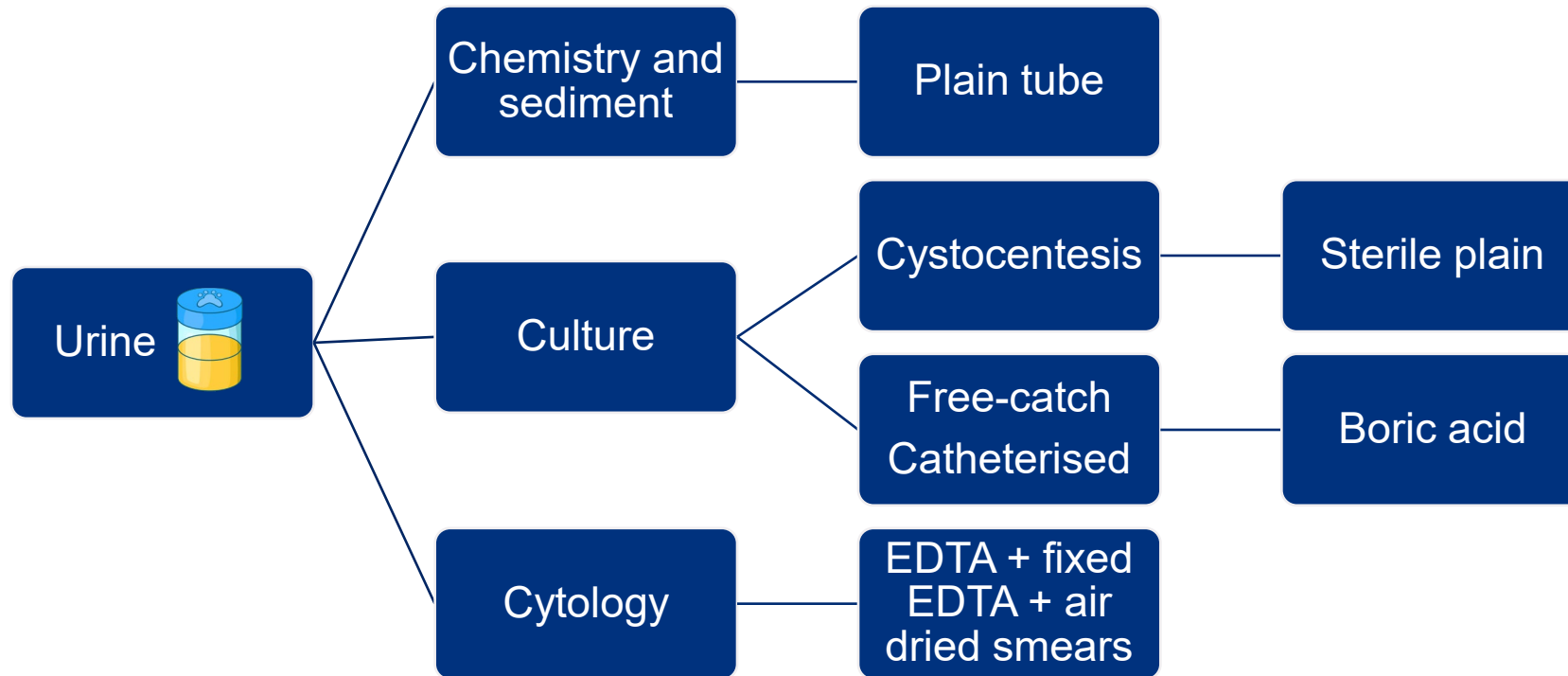


Urine Collection Methods

- Free catch
 - ≠ Litter tray
- Catheter
- Cystocentesis



Which tube do I use?



Sample Handling

Urinalysis

- Ideally processed within 1h from collection (Albasan et al, JAVMA 2003;)
- Refrigerated otherwise
- Allow to return to room temperature ahead of processing

Urine culture

- Boric acid for free catch samples and if delayed submission
- Sterile container for cystocentesis samples
- Ideally processed within 24h from collection, kept refrigerated in between



Laboratory diagnosis: Quantitative Bacterial Culture Results

- Takes into account numbers of bacterial present
- Reported in Colony Forming Units (CFU/ml)
- Different levels considered depending on collection method
 - Free catch $>10^5$ CFU/mL
 - Catheter $>10^4$ CFU/mL (cats); $>10^{4-5}$ CFU/mL (dogs)
 - Except if indwelling catheter
 - Cystocentesis $>10^3$ CFU/mL
- Test for antibacterial activity
- Antimicrobial Susceptibility Test (AST)



When to Consider Culturing

Prior to treatment

If clinical signs compatible with UTI

Treatment follow up

Recurrent UTI only

During treatment (if short course – not recommended; long course – possibly at 5-7 d)

After treatment (5-7 d post treatment) when clinical cure present

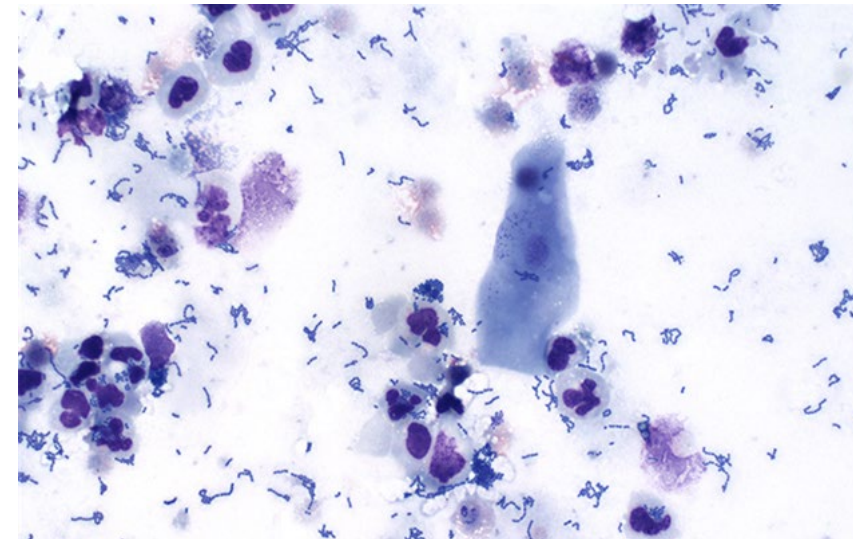
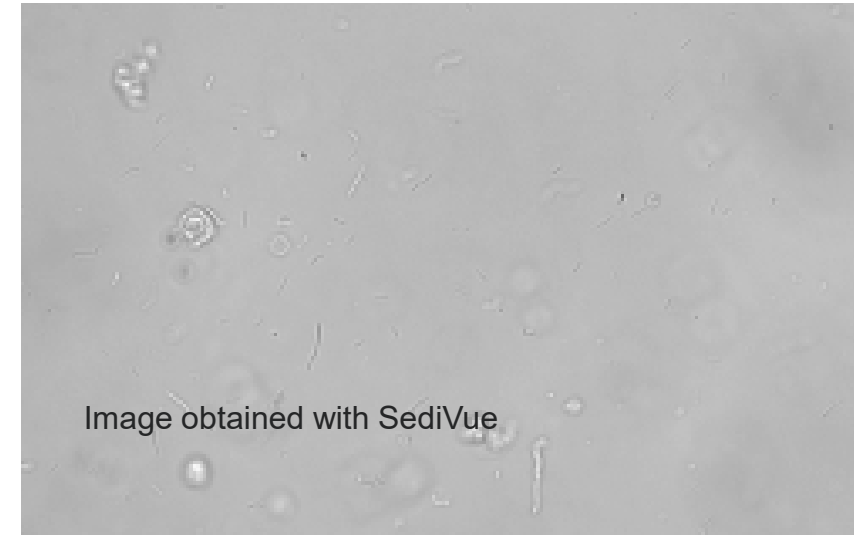
Patients with risk factors/no clinical signs of UTI

Suspected pyelonephritis; bladder as source for septicemia; dogs with struvite uroliths



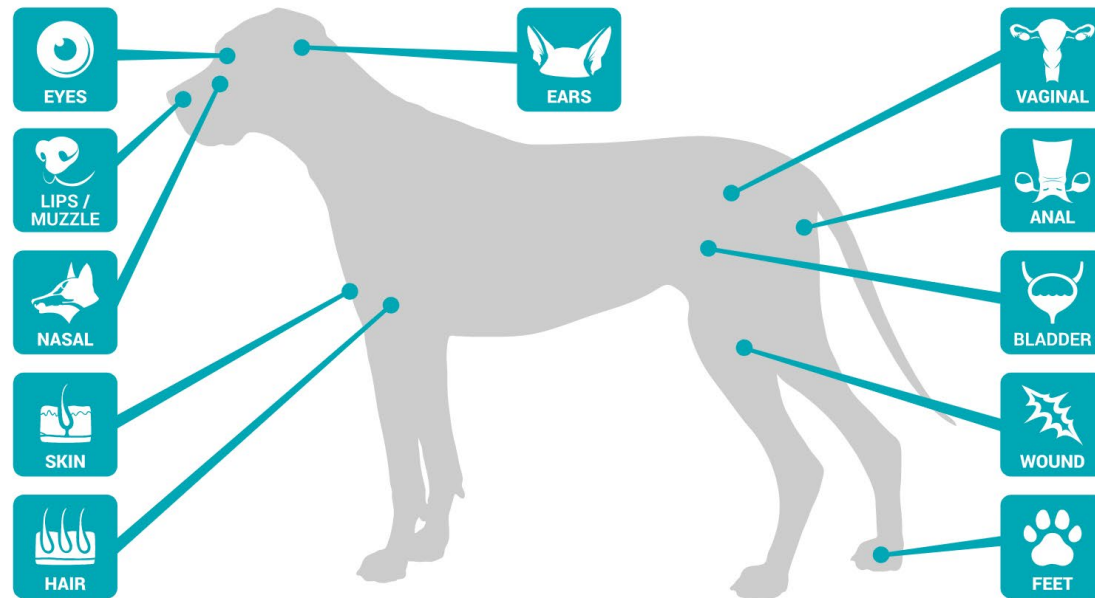
Interpreting the Lab Results

- Laboratory findings that support bacterial cystitis
 - Urinalysis (including sediment)
 - Haematuria
 - Pyuria
 - Bacteriuria
 - Cytologically evident bacteriuria
 - Quantitative bacterial culture results
 - AST



COMMON BACTERIA ISOLATED

CANINE ANATOMICAL SITES



www.petresist.com

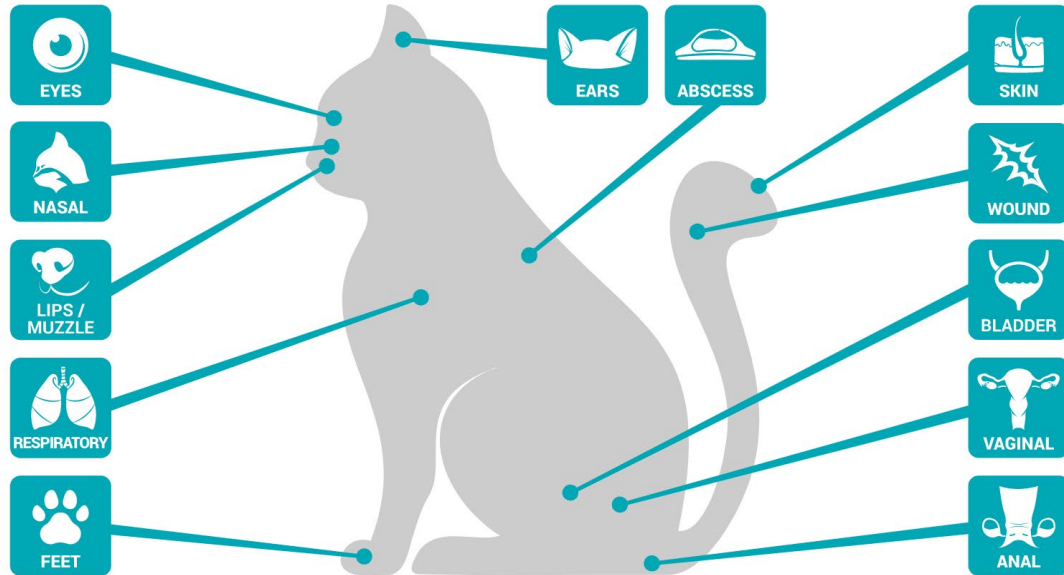
- Reflects what has been reported in the literature (Ling et al, 2001; Marques et al 2016; Moyaert et al 2017)

Top 10 Common Isolates

Eyes	
Lips / Muzzle	
Nasal	
Skin	
Hair	
Ears	
Vulva / Vaginal	
Anal Gland	
Urine / Bladder	
E.coli	62.3%
Proteus mirabilis	17.9%
Staphylococcus pseudintermedius	8.0%
Enterococcus spp	5.9%
Ps.aeruginosa	2.0%
Klebsiella pneumoniae	1.3%
coagulase-negative staphylococci	1.1%
Pseudomonas (non-aeruginosa)	0.6%
Enterobacter spp.	0.6%
Staphylococcus aureus	0.4%
Wound - other than spay	
Feet	

COMMON BACTERIA ISOLATED

FELINE ANATOMICAL SITES



www.petresist.com

- Reflects what has been reported in the literature (Marques et al 2016; Moyaert et al 2017)

Top 10 Common Isolates

Eyes	
Nasal	
Lips / Muzzle	
Respiratory	
Feet	
Ears	
Abscess	
Skin	
Wound - other than spay	
Urine / Bladder	
E.coli	66.2%
Enterococcus spp	21.0%
coagulase-negative staphylococci	6.0%
Proteus mirabilis	2.1%
Ps.aeruginosa	1.3%
Staphylococcus pseudintermedius	1.2%
Staphylococcus aureus	0.6%
Enterobacter spp.	0.6%
Acinetobacter spp.	0.6%
Pseudomonas (non-aeruginosa)	0.4%
Vulva / Vaginal	
Anal Gland	

Anatomy of a report

Urine

URINALYSIS

ALERT	TEST	RESULT	UNITS	REF.INTERVAL
	*Urine Appearance	Cloudy		
	*Colour	Brown		
	*Specific Gravity ^a	1.038		
	*pH	6.5		
	*Urine Protein	+++		
	*Glucose	NEGATIVE		
	*Ketones	+		
	*Blood / Haemoglobin	++++		
	*Bilirubin	++		
	*Urinalysis Test Method	Dipstick/SG measured using Roche U601 analyser		
	*White Blood Cells	>100	/hpf (<5)	<5 / hpf
	*Red Blood Cells	>100	/hpf (<5)	<5 / hpf
	*Epithelial Cells	None seen		
	*Casts	None seen		
	*Crystals	None seen		

MICROBIOLOGY

*Urine Culture	>10 ⁵ cfu/ml Escherichia coli.
*Urine Antibacterial Activity ^b	NEGATIVE

Depending on test(s) requested urinalysis will be reported in the same report as urine culture

Organism isolated and quantification quantification is useful when assessing significance

Urine Antibacterial Activity if positive may account for false negative results on culture

Anatomy of a report

AST – urine example

MIC

Isolate 1	Growth of E.coli				
Antibiotic	Result	MIC	Sensitivity Range		
*Ampicillin	Resistant	>=32	2	sssiR	32
*Amoxicillin-Clavulanic acid	Intermediate	16	2	ssslr	32
*Cephalexin	SENSITIVE	8	4	sSssr	64
*Cefovecin	SENSITIVE	2	0.5	ssSir	8
*Enrofloxacin	SENSITIVE	<=0.12	0.12	Sssiir	4
*Marbofloxacin	SENSITIVE	<=0.5	0.5	Ssir	4
*Pradofloxacin	SENSITIVE	<=0.12	0.12	Ssiir	4
*Doxycycline	Resistant	>=16	0.5	ssssiR	16
*Nitrofurantoin	SENSITIVE	<=16	16	Ssirrr	512
*Potentiated sulphonamides	Resistant	>=320	20	ssrrR	320
*Amoxicillin	Resistant				

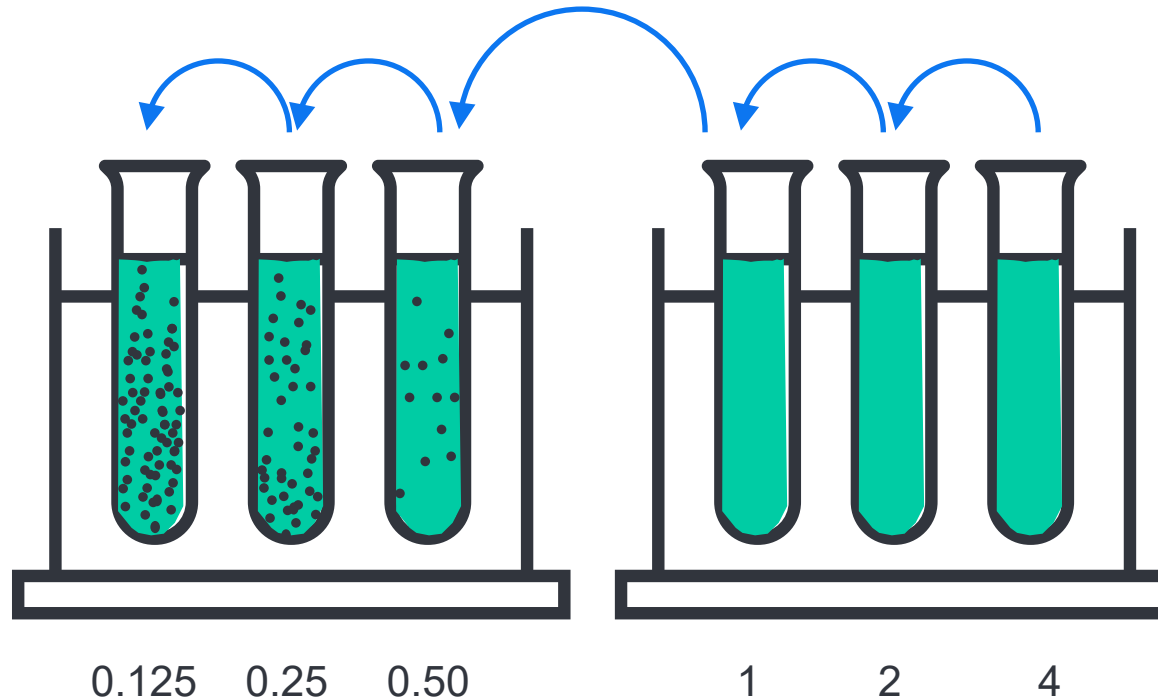
What does the result tell me?

What does the sensitivity range tell me?

Why don't I have an MIC value for Amoxicillin?
Surrogate or class reference antimicrobials

What is an MIC?

Minimum Inhibitory Concentration is the lowest concentration (in $\mu\text{g/ml}$) of an antibiotic that inhibits the growth of a given strain of bacteria.



What antibiotics should we test?

- Varies depending on organism detected
- Site of infection

- Numerous guidelines available, with CLSI having the more widely used veterinary specific guidelines <http://clsivet.org/>
- EUCAST guidelines may be more applicable to our strains but currently only human guidelines
 - VETCAST guidelines to come
 - ENOVAT

[CLSI VET01S ED6:2023](#)



 **EUCAST** EUROPEAN COMMITTEE
ON ANTIMICROBIAL
SUSCEPTIBILITY TESTING
European Society of Clinical Microbiology and Infectious Diseases

 **CLINICAL AND
LABORATORY
STANDARDS
INSTITUTE®**

Common questions

Bacteria +/- WBC+

Culture negative

- Other causes of inflammation
- Bacteria non viable
 - AM use
 - Extreme conditions (e.g. Temp; pH)
 - Excess Boric Acid
 - WBC inhibition
- "Pseudobacteria"
- Contaminated reagents (e.g. Sedistain)
- Non-significant growth

Bacteria - / WBC-

Culture positive

- Low bacterial numbers
- Lack of inflammation/reduced WBC migration
- Bacteria obscured by debris
- Growth of contaminants



To remember

- The presence of WBC indicates inflammation not infection
- Bacteria that are seen in UTI cases can also be seen with cases of asymptomatic bacteriuria
- Cystocentesis is the preferred collection method for uroculture
- Bacterial count (CFU/ml) cannot differentiate subclinical bacteriuria from bacterial cystitis

Nuna 8Y FE Bulldog

- One week straining to urinate
- Pollakiuria
- Dripping urine
- Haematuria
- PE unremarkable. Normothermia



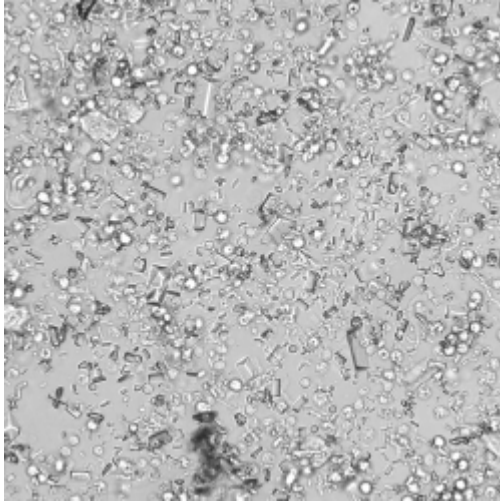
Nuna - Urinalysis

Test	Result	Range
Urine Free Catch sample		
	Colour: yellow, moderately turbid	
Specific gravity	1.020	
pH	8.0	
Protein	2+	
Glucose	-	
Ketones	-	
Bilirubin	-	
Blood	1+	

Nuna - Urinalysis

- High pH may interfere with protein
 - Need to check UPC
 - UPC 0.6 – need to assess the sediment
- Haem positive strip
 - Need to see if sediment has RBC
- Clinical signs suggest LUTD
 - Need to assess for inflammation, infection, crystals and atypical cells

SEDIMENT ANALYSIS



Many small dots...

- Identification of bacteria can be challenging
- If suspected first confirm with air dried stained cytological evaluation or with SediVue Bacteria Confirmation Kit
- Culture and sensitivity is recommended if bacteriuria is still suspected

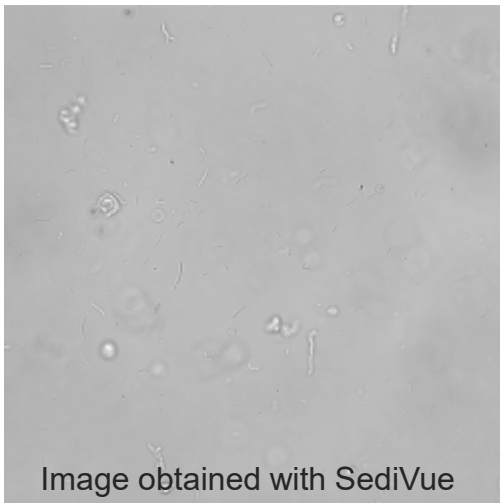
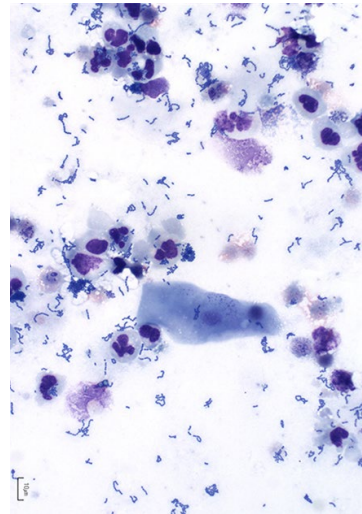


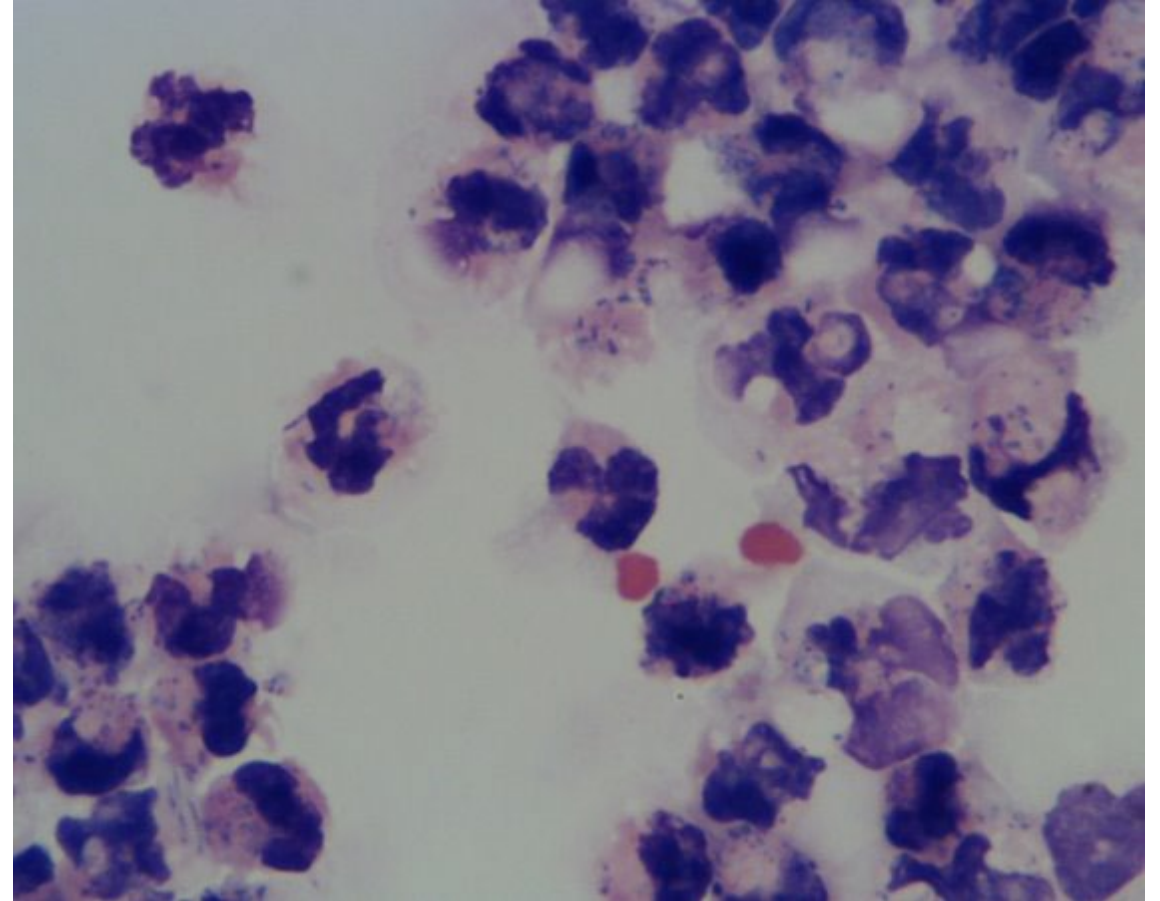
Image obtained with SediVue



Nuna sediment/ cytology

- + WBC 20-100 (<5/hpf)
- + RBC 5-20 (<5/hpf)
- + Epithelial cells ++
- + Bacteria +++
- + Casts – none seen

Consistent with UTI -
cystocentesis sample sent for
culture



Nuna - Urineculture

MIC

Isolate 1	*Growth of:E.coli				
Antibiotic	Result	MIC	Sensitivity Range		
*Ampicillin (1)	SENSITIVE	8	2	ssSir	32
*Amoxicillin-Clavulanic acid (1)	SENSITIVE	8	2	ssSir	32
*Cephalexin (1)	SENSITIVE	16	4	ssSsr	64
*Cefovecin (2)	SENSITIVE	1	0.5	sSsir	8
*Enrofloxacin (2)	SENSITIVE	<=0.12	0.12	Sssiir	4
*Marbofloxacin (2)	SENSITIVE	<=0.5	0.5	Ssir	4
*Pradofloxacin (2)	SENSITIVE	<=0.12	0.12	Ssiirr	4
*Doxycycline (1)	SENSITIVE	2	0.5	ssSsir	16
*Nitrofurantoin (2)	SENSITIVE	<=16	16	Ssirrr	512
*Potentiated sulphonamides (1)	SENSITIVE	<=20	20	Ssrrr	320
*Amoxicillin (1)	SENSITIVE				

Note: Generic antibiotics quoted. The choice of antibiotic and knowledge of any contraindications is the Veterinary Surgeons responsibility. MIC units expressed in ug/ml. Antibiotics without a MIC have been predicted using international guidelines. For more information on interpretation of MICs visit idexx.co.uk/MIC

Key for numbers appearing after antibiotic names:

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- (3) Third-line antimicrobial - this is a third-line antimicrobial and should ideally be reserved for human use

*Urine Culture >10⁵ cfu/ml Escherichia coli.

*Urine Antibacterial Activity ^a NEGATIVE

ISCAID GUIDELINES

Antimicrobial Use Guidelines for Treatment of Urinary Tract Disease in Dogs and Cats: Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases

**J. Scott Weese,¹ Joseph M. Blondeau,² Dawn Boothe,³ Edward B. Breitschwerdt,⁴
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ISCAID GUIDELINES

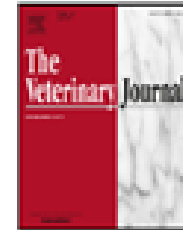
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International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats



J. Scott Weese^{a,*}, Joseph Blondeau^{b,c}, Dawn Boothe^d, Luca G. Guardabassi^{e,f},
Nigel Gumley^g, Mark Papich^h, Lisbeth Rem Jessenⁱ, Michael Lappinⁱ, Shelley Rankin^k,
Jodi L. Westropp^l, Jane Sykes^l

Bacterial Cystitis

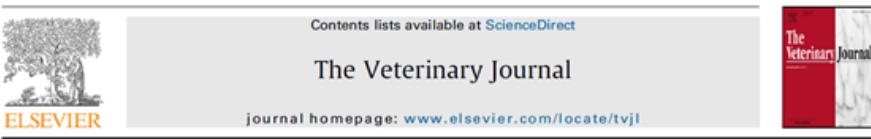
Sporadic

- + Occasional or first episode
- + Common in dogs
 - + Female, older
 - + Males, risk of prostatitis
- + Occasional in cats

Recurrent

More than one episode

- + 3 or more episodes in 12 months
- + 2 or more episodes in 6 months
- + There is
 - + Relapse
 - + Reinfection
 - + Persistent infection



International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats



Bacterial Cystitis - Types

- **Sporadic Cystitis**

Initial or rare episodes of cystitis

Less than 3 in 12 months

Less than 2 in 6 months

Common in dogs

Occasional in cats

Risk of prostatitis in intact male dogs

Weese JS, et al. International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats. Vet J. 2019 May;247:8-25. PMID: 30971357.

Bacterial Cystitis - Types

- **Recurrent Cystitis**

3 or more episodes in 12 months
2 or more episodes in 6 months

Underlying cause for UTI's present

Repeated antibiotic treatment not a good approach on its own!!!

Not solve the problem

Risk of antibiotic resistance

Relapse?

Re-infection?

Persistent infection?

Weese JS, et al. International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats. Vet J. 2019 May;247:8-25. PMID: 30971357.

What Antibiotic To Use?

- Results of C&S
- Site
- Cascade
- Antibiotic stewardship

Treatment length depends on conditions

Antibiotics

First Line Antibiotics

- Amoxicillin (+/- clavulanic)
- Trimethoprim-sulfonamides

Other antibiotics

- **Convenience versus need**
- Avoid unless needed as per C&S/Site
 - Fluoroquinolones
 - Third generation cephalosporins
 - Nitrofurantoin

FECAVA Recommendations for Appropriate Antimicrobial Therapy



Lower UTI

- Culture of urine by cystocentesis (most cases)
- When inflammation and infection evident on cytology
 - Amoxicillin or TMPS while culture is pending
 - Amoxicillin Q8h (TID)

Upper UTI (pyelonephritis)

- Culture of urine by cystocentesis (most cases)
- TMPS or fluoroquinolones while culture is pending
- Amoxicillin/clavulanate Q8h (TID)

Suggested empirical choices. When good local data is available, this be taken into consideration for treatment choices. Use antimicrobials with good bioavailability at target tissue. Use as narrow spectrum as possible. Always follow cascade and national legislation.

BSAVA – PROTECT

Antimicrobials not indicated in

- Feline idiopathic cystitis (FIC)
- Struvite urolithiasis in the cat
- Non-struvite urolithiasis in the dog (most cases)
- Urinary incontinence
- Subclinical bacteriuria
- Juvenile canine vaginitis

Antimicrobials indicated in:

- Sporadic (uncomplicated) symptomatic, canine UTI (cystitis):
 - Amoxicillin (\pm clavulanate)
 - TMPS
- Reinfection, recurrent and persistent UTI:
 - Amoxicillin (\pm clavulanate)
 - TMPS
 - Always guided by AST
 - Reinfection – Same AM if successful
 - Recurrent/Persistent – use AST to modify AM
 - Address predisposing cause

Nuna – Urine culture

MIC

Isolate 1	*Growth of:E.coli				
Antibiotic	Result	MIC	Sensitivity Range		
*Ampicillin (1)	SENSITIVE	8	2	ssSir	32
*Amoxicillin-Clavulanic acid (1)	SENSITIVE	8	2	ssSir	32
*Cephalexin (1)	SENSITIVE	16	4	ssSsr	64
*Cefovecin (2)	SENSITIVE	1	0.5	sSsir	8
*Enrofloxacin (2)	SENSITIVE	<=0.12	0.12	Sssiir	4
*Marbofloxacin (2)	SENSITIVE	<=0.5	0.5	Ssir	4
*Pradofloxacin (2)	SENSITIVE	<=0.12	0.12	Ssiirr	4
*Doxycycline (1)	SENSITIVE	2	0.5	ssSsir	16
*Nitrofurantoin (2)	SENSITIVE	<=16	16	Ssirrr	512
*Potentiated sulphonamides (1)	SENSITIVE	<=20	20	Ssrrr	320
*Amoxicillin (1)	SENSITIVE				

Note: Generic antibiotics quoted. The choice of antibiotic and knowledge of any contraindications is the Veterinary Surgeons responsibility. MIC units expressed in ug/ml. Antibiotics without a MIC have been predicted using international guidelines. For more information on interpretation of MICs visit idexx.co.uk/MIC

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- (3) Third-line antimicrobial - this is a third-line antimicrobial and should ideally be reserved for human use

*Urine Culture

>10⁵ cfu/ml Escherichia coli.

*Urine Antibacterial Activity ^a

NEGATIVE

More than the MIC

If all AM are susceptible

- Choose narrow spectrum
- Avoid HPCIA (fluroquinolones, 3rd gen cephalosporins)
- Tissue penetration (e.g prostate)
- Safety and ease of use for the patient
 - Age
 - Immunocompetence
 - Kidney or liver disease
 - KCS
- Source control (e.g. uroliths)
- Prescribing cascade, local legislation, availability of antimicrobial and cost

If AM susceptible but not responding

- Patient factors
 - Immunocompromise/predisposing factors
- Compliance
- Incorrect dose, route, frequency of administration.
- Presence of biofilm, pus, or FB/mass
- PK/PD of antimicrobial(s)
- Acquired R during treatment
- Incorrect diagnosis/Wrong organism recovered
- **REPEAT CULTURE MAY BE NEEDED!**

Case Lily

11Y FN dog
American Cocker Spaniel

Symptoms compatible
with sporadic cystitis

Presenting for the first
time

MIC

Isolate 1	*Growth of: E.coli				
Antibiotic	Result	MIC	Sensitivity Range		
*Ampicillin (1)	Resistant	>=32	2	sssiR	32
*Amoxicillin-Clavulanic acid (1)	Resistant	>=32	2	sssiR	32
*Cephalexin (1)	Resistant	>=64	4	ssssR	64
*Cefovecin (2)	Resistant	>=8	0.5	sssiR	8
*Enrofloxacin (2)	SENSITIVE	<=0.12	0.12	Sssiir	4
*Marbofloxacin (2)	SENSITIVE	<=0.5	0.5	Ssir	4
*Pradofloxacin (2)	SENSITIVE	<=0.12	0.12	Ssiirr	4
*Doxycycline (1)	SENSITIVE	2	0.5	ssSsir	16
*Nitrofurantoin (2)	SENSITIVE	32	16	sSrrr	512
*Potentiated sulphonamides (1)	SENSITIVE	<=20	20	Ssrrr	320
*Amoxicillin (1)	Resistant				

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(3) Third-line antimicrobial - this is a third-line antimicrobial and should ideally be reserved for human use

*Urine Culture >10⁵ cfu/ml Escherichia coli.
*Urine Antibacterial Activity ^a NEGATIVE

Secondary effects of some antimicrobials

TMPS

- Immune-mediated adverse effects such as keratoconjunctivitis sicca, immune-mediated thrombocytopenia, or immune-mediated hemolytic anemia may occur in dogs.
- Immune-mediated polyarthropathy has been noted in black-and-tan dogs and should therefore not be used in these breeds or mixed-breeds.
- Obtaining a baseline Schirmer tear test value and weekly monitoring thereafter are recommended to determine if adverse effects are developing. Serial CBC monitoring may also be useful for patients receiving prolonged treatment.

Case Shadow

9Y MN dog

PU/PD

On AM for a separate condition

History of uroliths

MIC

Antibiotic	Result	MIC	Sensitivity Range		
*Amoxicillin-Clavulanic acid (1)	Resistant	8	2	ssRrr	32
*Cefovecin (2)	Resistant	>=8	0.5	sssiR	8
*Amikacin (2)	SENSITIVE	<=2	2	Ssssir	64
*Gentamicin (2)	SENSITIVE	<=0.5	0.5	Ssssir	16
*Enrofloxacin (2)	Resistant	>=4	0.5	siiR	4
*Marbofloxacin (2)	Resistant	>=4	0.5	ssiRr	8
*Pradofloxacin (2)	Intermediate	1	0.12	ssilrr	4
*Doxycycline (1)	SENSITIVE	4	0.5	sssSir	16
*Minocycline (1)	SENSITIVE	2	0.5	ssSsir	16
*Nitrofurantoin (2)	SENSITIVE	<=16	16	Ssirrr	512
*Florfenicol (1)	SENSITIVE	<=4	4	Ssrr	32
*Potentiated sulphonamides (1)	SENSITIVE	<=10	10	Sssrrr	320
*Amoxicillin (1)	Resistant				
*Ampicillin (1)	Resistant				
*Cephalexin (1)	Resistant				

Organism identified by MALDI-TOF

This isolate was identified by MALDI-TOF and has been confirmed as a Methicillin-resistant *Staphylococcus pseudintermedius* (MRSP).

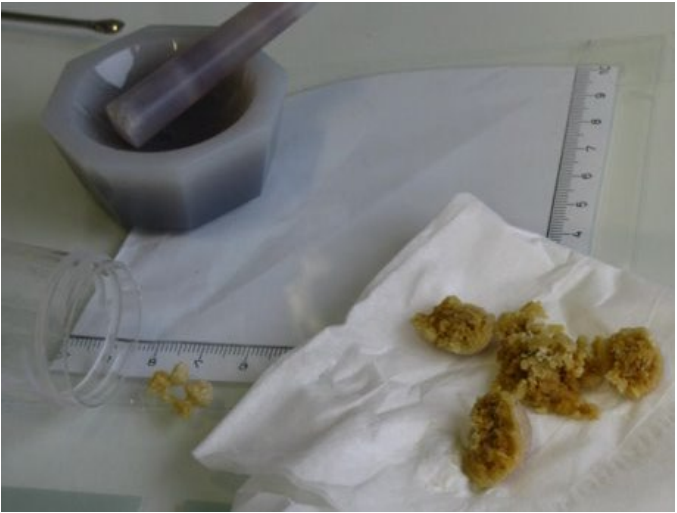
Note: Generic antibiotics quoted. The choice of antibiotic and knowledge of any contraindications is the Veterinary Surgeons responsibility. MIC units expressed in ug/ml. Antibiotics without a MIC have been predicted using international guidelines. For more information on interpretation of MICs visit idexx.co.uk/MIC

Key for numbers appearing after antibiotic names:

- (1) First-line antimicrobial – this should be considered a first-line antimicrobial where antimicrobial treatment is required
- (2) Second-line antimicrobials – this is a second-line antimicrobial and should be reserved for when first-line antimicrobials are ineffective or inappropriate for the clinical case.
- (3) Third-line antimicrobial - this is a third-line antimicrobial and should ideally be reserved for human use

*Urine Culture 10⁴ - 10⁵ cfu/ml *Staphylococcus pseudintermedius*.
 *Urine Antibacterial Activity ^a NEGATIVE

Urolith Culture



Culture positive	Component					Grand Total
	Ammonium urate	Calcium oxalate	Calcium phosphate	Cystine	Struvite	
Isolate						
Staph pseudintermedius			1		20	21
Enterococcus		2			4	6
E. coli		1			3	4
NPI		1		1	1	3
Staph aureus	1					1
Coag neg staph				1		1
Pantoea		1				1
Proteus					1	1
Grand Total	1	5	1	2	29	38

N = 84
 No growth = 46/84 (55%)
 Table shows the results for the positive cultures, along urolith major component

Case Milo

8 yo ME dog

Haematuria, dysuria, enlarged prostate

Many dogs shed into urine

Male entire dog with UTI – suspect prostatic involvement

If negative culture/refractory to treatment:

Prostatic wash

Aspirate abscesses/cysts

Treatment:

Consider tissue penetration

Fluoroquinolones

TMPS

DA (Gram +)

4-6 weeks

+medical/surgical castration

MIC

Isolate 1

*Growth of: *Proteus mirabilis*

Antibiotic	Result	MIC	Sensitivity Range		
*Ampicillin (1)	SENSITIVE	<=2	2	Sssir	32
*Amoxicillin-Clavulanic acid (1)	SENSITIVE	<=2	2	Sssir	32
*Cephalexin (1)	SENSITIVE	16	4	ssSsr	64
*Cefovecin (2)	SENSITIVE	<=0.5	0.5	Sssir	8
*Enrofloxacin (2)	SENSITIVE	<=0.12	0.12	Sssiir	4
*Marbofloxacin (2)	SENSITIVE	<=0.5	0.5	Ssir	4
*Pradofloxacin (2)	SENSITIVE	<=0.12	0.12	Ssiir	4
*Doxycycline (1)	Resistant				
*Nitrofurantoin (2)	Resistant	128	16	ssiRrr	512
*Potentiated sulphonamides (1)	SENSITIVE	<=20	20	Ssrrr	320
*Amoxicillin (1)	SENSITIVE				

Organism identified by MALDI-TOF

Note: Generic antibiotics quoted. The choice of antibiotic and knowledge of any contraindications is the Veterinary Surgeons responsibility. MIC units expressed in ug/ml. Antibiotics without a MIC have been predicted using international guidelines. For more information on interpretation of MICs visit idexx.co.uk/MIC

Key for numbers appearing after antibiotic names:

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(3) Third-line antimicrobial - this is a third-line antimicrobial and should ideally be reserved for human use

*Urine Culture

>10⁵ cfu/ml *Proteus mirabilis*.

*Urine Antibacterial Activity

Evaluation not possible (bacterial interference)

Case Storm

14Y FN dog

Suspicious of TCC

Free catch sample
Urine culture and
cytology

MIC

Isolate 1	Growth of: Pseudomonas aeruginosa				
Antibiotic	Result	MIC	Sensitivity Range		
Amikacin (2)	SENSITIVE	4	2	sSssir	64
Gentamicin (2)	SENSITIVE	<=1	1	Sssir	16
Enrofloxacin (2)	SENSITIVE	0.5	0.12	ssSiir	4
Marbofloxacin (2)	SENSITIVE	<=0.5	0.5	Ssir	4
Tobramycin (2)	SENSITIVE				

Note: Generic antibiotics quoted. The choice of antibiotic and knowledge of any contraindications is the Veterinary Surgeons responsibility. MIC units expressed in ug/ml. Antibiotics without a MIC have been predicted using international guidelines.

Pseudomonas aeruginosa are tested against an extended panel of antibiotics as they are naturally resistant to ampicillin, amoxicillin-clavulanic acid, clindamycin, cephalexin, and cefovecin. Isolates may develop resistance during prolonged therapy with all antimicrobial agents. Therefore, isolates that are initially susceptible may become resistant within three or four days after initiation of therapy. Testing of repeat isolates may be warranted.

For more information on interpretation of MICs visit idexx.co.uk/MIC

Key for numbers appearing after antibiotic names:

- (1) First-line antimicrobial – this should be considered a first-line antimicrobial where antimicrobial treatment is required
- (2) Second-line antimicrobials – this is a second-line antimicrobial and should be reserved for when first-line antimicrobials are ineffective or inappropriate for the clinical case.
- (3) Third-line antimicrobial - this is a third-line antimicrobial and should ideally be reserved for human use

Urine Culture	10 ⁴ - 10 ⁵ cfu/ml Pseudomonas aeruginosa. Organism identified by MALDI-TOF
Urine Antibacterial Activity ^a	POSITIVE

Pyelonephritis

- Clinical signs of systemic Dz:
 - Fever
 - Lethargy
 - PU/PD
 - Renal pain
- Lab results
 - Evidence of systemic inflammation on bloods
 - Azotaemia
 - Pyuria/bacteriuria
 - Positive culture
 - Cylindruria
- Imaging findings:
 - Dilation of renal pelvis
 - Blunting of renal papilla
- Empirical treatment while awaiting culture:
 - Fluoroquinolones
 - TMPS
 - (+/-) Amoxicillin/clavulanate
- AM treatment should be adjusted based on culture results
- Treatment length needs to be guided by the specific case
 - 2 (ISCAID) -4 weeks

Case Storm Cytology

14Y FN dog

Suspicious of TCC

Evaluate alongside with imaging

BRAF test

*Clinical Pathologist's Report (#)

INTERPRETATION:

- 1) Pyuria, marked
- 2) Bacteriuria, marked
- 3) Haematuria, slight
- 4) Mild epithelial atypia

COMMENTS:

The cytological features are consistent with pyuria and bacteriuria, with slight haematuria. These findings are supportive of infection, but should be interpreted in light of clinical signs, as well as method of urine sampling. Inflammation/infection may originate elsewhere in the genitourinary tract e.g. pyelonephritis, prostatitis. Correlation with the results of quantitative bacterial culture and antibiotic sensitivity testing is recommended in order to determine the best approach to treatment.

Evaluation for conditions which may predispose to urinary tract infection is also indicated if not already performed (e.g. immune suppression, urinary incontinence, urolithiasis). Mild epithelial atypia is noted. This is likely secondary to the observed inflammation and urinary tract infection, however correlation with imaging beneficial in excluding potential further underlying pathology, such as neoplasia.

CYTOPATHOLOGIC DESCRIPTION:

A concentrated cytospin slide prepared from the submitted urine sample is examined. There is a slight proteinaceous background containing scattered erythrocytes and moderate numbers of markedly karyolytic neutrophils, as well as abundant intra- and extracellular bacterial coccobacilli. Low numbers of epithelial cells are present. They have mild to occasionally moderate atypia, with finely action mild anisokaryosis.

Case Lucy

7Y FE dog

History of ongoing bacterial cystitis

Free catch sample

Search of records revealed prolonged history of recurrent UTIs with different organisms

Ideally confirm with cystocentesis sample

Search for underlying cause

We can provide additional AM testing in MDR

URINALYSIS

ALERT	TEST	RESULT	UNITS	REF.INTERVAL
	Urine Appearance	CLOUDY		
	Colour	YELLOW		
	Specific Gravity	1.025		
	pH	6.0		
	Urine Protein	NEGATIVE		
	Glucose	NEGATIVE		
	Ketones	NEGATIVE		
	Blood / Haemoglobin	NEGATIVE		
	Bilirubin	NEGATIVE		
	Urinalysis Test Method	Dipstick/SG results measured by manual methods.		
	White Blood Cells	50-100		<5 / hpf
	Red Blood Cells	None seen		<5 / hpf
	Epithelial Cells	None seen		
	Casts	None seen		
	Crystals	None seen		

MICROBIOLOGY

Urine Culture	10 ⁴ - 10 ⁵ cfu/ml Escherichia coli. 10 ⁴ - 10 ⁵ cfu/ml Escherichia coli.
Urine Antibacterial Activity ^a	NEGATIVE

MIC

Isolate 1

Growth of: E.coli

Antibiotic	Result	MIC	Sensitivity Range		
Ampicillin (1)	Resistant	>=32	2	sssiR	32
Amoxicillin-Clavulanic acid (1)	Intermediate	16	2	ssslr	32
Cephalexin (1)	Resistant	>=64	4	ssssR	64
Cefovecin (2)	Resistant	>=8	0.5	sssiR	8
Enrofloxacin (2)	Resistant	>=4	0.12	sssiR	4
Marbofloxacin (2)	Resistant	>=4	0.5	ssiR	4
Pradofloxacin (2)	Resistant	>=4	0.12	ssiiR	4
Doxycycline (1)	SENSITIVE	2	0.5	ssSsir	16
Nitrofurantoin (2)	Resistant	128	16	ssiRrr	512
Potentiated sulphonamides (1)	Resistant	>=320	20	ssrrR	320
Amoxicillin (1)	Resistant				

Take home message

To treat or not to treat (with antimicrobials)

- Consider using strategies to limit antimicrobial prescription
- Asymptomatic bacteriuria does not require antimicrobial treatment in most cases



No antibiotic prescription required

Veterinary practice name and address:

Antibiotics can cause harmful side effects to your pet. Taking unnecessary antibiotics can also promote resistant bacteria that are a threat to animal and human health. For more information, scan the QR code or visit www.bsavalibrary.com/NAPR



Pet's name: _____

Owner: _____

Veterinary surgeon: _____

Signature: _____ Date: _____

Based on a thorough examination and the history you provided, an antibiotic is **not** needed for your pet today.

Current findings:

- Diarrhoea, lasts 5–7 days on average
- Vomiting
- Cough, lasts 7–10 days on average
- Nasal discharge ± sneezing
- Cystitis (cats only), signs last 3–5 days on average
- Cat bite, abscess or superficial wound, should heal within 3–5 days
- Other: _____

These conditions are not commonly caused by bacteria so antibiotics will not help. Those that can be caused by bacteria most often get better on their own (diarrhoea) or after lancing and draining (abscess).

What should you do:

- Feed a bland diet
Example diet: _____
- Ensure regular fluid intake by wetting the food and offering multiple water sources
- Avoid contact with other animals (your pet may have a viral infection)
- Restrict exercise (your pet needs rest)
- Other: _____

What to do if things get worse: If your pet is not better in _____ days' time, if new symptoms are observed or if you have further concerns, please call or visit the clinic.



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Take home messages

- Only test appropriate patients
 - Remember asymptomatic bacteriuria does not require antimicrobial treatment
- Cystocentesis sample whenever possible
- Antimicrobial Stewardship is a shared responsibility
- It's meant to be a partnership
 - Similar to a referral to a specialist hospital – provide relevant clinical info
 - Dealing with complicated cases or MDR ?
 - When in doubt – ask us to help out!



Thank you
all for your
attention!
Questions?



Questions?

