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Urinary Tract Infection Workup

I. Introduction

Urinary tract infections (UTI) are one of the most commonly encountered acute infectious diseases. Most UTIs occur as a result of bacteria ascending the urethra and entering the urinary bladder.

Urine specimens for culture are collected when the following syndromes are suspected: cystitis, pyelonephritis, asymptomatic bacteriuria, and less commonly acute prostatitis, pyelonephric abscess, and urosepsis.

Among the bacteria most commonly isolated from patients with acute uncomplicated cystitis are *Escherichia coli*, *Klebsiella* species, and other Enterobacterales and *Staphylococcus saprophyticus.* Hospitalized patients and patients with complicated urinary tract infections are commonly infected with *E. coli, Klebsiella* species, *Proteus mirabilis*, other Enterobacterales, *Pseudomonas aeruginosa* and enterococci. *Corynebacterium urealyticum* and Group B Streptococcus are markers of colonization in pregnant women.

Urine specimens can be divided into categories based on clinical criteria, the possibility of urethral contamination, and the extent of microbiological work-up.

For diagnosis of Urinary Tract Infection:
- Voided urines (non-sterile): Midstream urine (MSU)
  Neonatal bagged urine
  Indwelling catheter (Foley catheter) urine
  Ileal conduit urine
  Suprapubic catheter urine
- In and out catheter / catheter insertion urine / bladder irrigation
- Aseptically collected urine: Nephrostomy urine
  cystoscopy urine
  Suprapubic aspirate

For diagnosis of Prostatitis:
- Segmented urine and expressed prostatic secretion (EPS). See Prostatitis Workup

For diagnosis of Male infertility:
- Seminal fluid. See Genital Manual
Quantitative cultures of urine specimens are critical for diagnosis. The criteria to be used for distinguishing significant from non-significant growth may vary depending on the type of urine specimen received for culture.

Urine specimens arriving in the laboratory must be accessioned and processed as soon as possible.

II. Specimen Collection and Transplant

See Pre-analytical Procedure - Specimen Collection QPCMI02001

III. Reagents/Materials/Media

See Analytical Process - Bacteriology Reagents_Materials_Media List QPCMI10001

IV. Procedure

A. Processing of Specimens:

See Specimen Processing Procedure

Asymptomatic Bacteriuria Urine Hold Processing:
See Specimen Processing Procedure for procedure to handle requests to process Asymptomatic Bacteriuria - Urine "Hold" specimens.

a) Direct Examination:
Gram stain: Not routinely performed. If specifically requested, perform Gram stain directly on unspun specimen.

Fungal stain: Not routinely performed. If dimorphic fungus or cryptococcus specifically requested, see Mycology Manual for staining and interpretation.

Eosinophil stain: Not routinely performed. If requested, stain slide and examine for the presence of eosinophils due to inter-tissue nephritis.

B. Interpretation of cultures:

Examine plates after appropriate incubation time.

a) **Cultures with no growth:**

Discard no growth routine cultures after 18-24 hrs incubation.
Exceptions:
- Urine specimens processed after 1600 hrs (plates from the "After 4 p.m." basket) – re-incubated until 1400 hrs and re-examine

b) **Cultures with growth:**

1. If colonies are too small – re-incubate for another 24hrs.
2. Count the colonies and multiply by the appropriate dilution factor in SI units.

Inoculation Loop size	Colony count/L
0.001 mL	1 colony = 1 x 10^6 CFU/L
0.01 mL	1 colony = 0.1 x 10^6 CFU/L

3. Workup cultures according to the criteria in Tables 1, 2 and 3 below. The tables are meant to serve as a guide only.
4. Save Group B streptococcus isolates for 10 days at room temperature in case further susceptibility testing is required
5. Save positive yeast cultures for 10 days at room temperature in case further work-up is required.

List of Uropathogens and Non-Uropathogens:

Uropathogens	**Non-uropathogens** (normal skin/urogenital flora)
Enterobacterales *Pseudomonas aeruginosa* Other gram negative bacilli *Enterococcus* species beta-haemolytic streptococci (Group A, B, C, G, >0.5mm colonies) Yeast *Aerococcus urinae** *Aerococcus sanguinicola** *Corynebacterium urealyticum* *Staphylococcus aureus* *Staphylococcus saprophyticus* - (females 12 - 60 yrs only) Other coagulase negative staphylococci (including *Staphylococcus lugdenensis*)*	*Lactobacillus* diphtheroids (not *C. urealyticum*) viridans Streptococci (not *A. uriae*) *Streptococcus anginosus* group *Streptococcus gallolyticus* *Bacillus* species

* Consider as **uropathogens** only when pure/predominant over non-uropathogens

TABLE 1: Criteria for the identification and susceptibility testing of organisms isolated from Voided Urines (MSU, neonatal bagged urine, indwelling catheter, Foley catheter urine, ileal conduit urine, and suprapubic catheter).

No. of Types of Organisms[1, 2, 3]	No. of colonies of each type	Colony count/L of uropathogens	Work up for uropathogens	Report
1	<10	<10 x 10^6 CFU/L	No work-up	No significant growth
1	≥10	≥10 x 10^6 CFU/L	ID + Sens	10-100 x E6 cfu/L
2	Both ≥100	≥100 x 10^6 CFU/L	ID + Sens on both	>100 x E6 cfu/L
2	One ≥100 One <100	≥100 x 10^6 CFU/L <100 x 10^6 CFU/L	ID + Sens Ignore	>100 x E6 cfu/L
2	Both <100	<100 x10^6 CFU/L	No work-up	No significant growth
≥3	All **uropathogens** <100		No work-up	No significant growth
≥3	Any **uropathogen** ≥100		No work-up	Mixed growth

ID =Identification; = Susceptibility testing as appropriate

Note:
1. When counting the types of organisms, do not include <10 colonies of **non-uropathogens**.
2. Do not workup or report any number of colonies of **non-uropathogens**
3. For female ages 12-60 yrs, workup any amount of beta-haemolytic streptococcus to rule out Group B streptococcus. (Reporting – follow **Reporting Table for GBS**)

TABLE 2: Criteria for identification and susceptibility testing of organisms isolated from In and Out Catheter/Catheter Insertion urines, Bladder Irrigation urines.

No. of Types of Organisms [1, 2, 3]	No. of colonies of each type	Colony count/L of uropathogens	Work-up for uropathogens	Report
1	<10	<10 x 10^6 CFU/L	No work-up	No significant growth
1	≥10	≥10 x 10^6 CFU/L	ID + Sens	10-100 x E6 cfu/L or >100 x E6 cfu/L
2	Both ≥10	≥10 x 10^6 CFU/L	ID + Sens	10-100 x E6 cfu/L or >100 x E6 cfu/L
2	One ≥10 One <10 or factor of 10x less	≥10 x 10^6 /L Use phrase - Light growth -on LIS **TEST Comment**	ID + Sens	10-100 x E6 cfu/L or >100 x E6 cfu/L Describe[4]

No. of Types of Organisms [1, 2, 3]	No. of colonies of each type	Colony count/L of uropathogens	Work-up for uropathogens	Report
		(do not enter as ISOLATE)		
3	≥10 Other(s) <10 or factor of 10x less	≥10 x 10^6 CFU/L Use phrase - Light growth -on LIS **TEST Comment** (do not enter as ISOLATE)	ID + Sens	10-100 x E6 cfu/L or 10-100 x E6 cfu/L Describe[4]
≥4	All **uropathogens** <10		No work-up	No significant growth
≥4	Any **uropathogen** ≥10		No work-up	Mixed growth

ID = Identification; Sens = Susceptibility testing as appropriate

Note: 1. When counting the types of organisms, do not include <10 colonies of **non-uropathogens**.
2. Do not workup or report any number of colonies of **non-uropathogens**.
3. For female ages 12-60 yrs, workup any amount of beta-haemolytic streptococcus to rule out Group B streptococcus. (Reporting – follow **Reporting Table for GBS**)
4. Describe as Gram positive cocci, Gram positive bacilli, Gram negative bacilli.

TABLE 3: Criteria for the identification and susceptibility testing of organisms isolated from aseptically collected urine, suprapubic aspirates, cystoscopy urine and nephrostomy urine.

No. of Types of Organisms	No. of colonies of each type	Colony count/ L	Work-up
Any #	Any	Quantitate using appropriate dilution factor	ID & Sens

Inoculation Loop size	Colony count/L
0.001 mL 0.01 mL	1 colony = 1 x 10^6 CFU/L 1 colony = 0.1 x 10^6 CFU/L

ID = Identification; Sens = Susceptibility testing as appropriate

C. Susceptibility Testing:

Refer to Susceptibility Testing Manual

V. Reporting

Direct Smear (if requested):

Gram Stain: "(No) Pus cells seen. (No) Bacteria seen" (without quantitation)

Eosinophil Stain: Negative report: "No Eosinophil seen"
Positive report: "Eosinophils present"

Negative Culture Reporting:

Result Category	**Reporting**			
	C&S	**C&S + routine fungus requested and no FUNGUS test ordered**	**C&S + routine fungus requested and FUNGUS test ordered**	***Cryptococcus* or specific filamentous fungus requested**
No growth	"No growth"	"No growth. Routine urine fungal cultures screen for significant growth of yeast only. Filamentous fungi will not be ruled out unless a specific request is made" (pick from **TEST window** keypad - **}NGU**).	**C&S** TEST - "No growth"	**C&S** TEST - "No growth"
			Fungus TEST - "No growth. Routine urine fungal cultures screen for significant growth of yeast only. Filamentous fungi will not be ruled out unless a specific request is made" (pick from **TEST window** keypad - **}NGU**)	**Fungus** TEST – as per Mycology manual.
No significant growth • Growth with no workup	"No significant growth" (pick from **TEST window** keypad - **}NSG**)	"No significant growth. Routine urine fungal cultures screen for significant growth of yeast only. Filamentous fungi will not be ruled out unless a specific request is made." (pick from **TEST window** keypad - **}NSGU**)	**C&S** TEST - "No significant growth. Routine urine fungal cultures screen for significant growth of yeast only. Filamentous fungi will not be ruled out unless a specific request is made." (pick from **TEST window** keypad - **}NSGU**)	**C&S** TEST - "No significant growth" (pick from TEST window keypad - }NSG)
			Fungus TEST - "No significant growth. Routine urine fungal cultures screen for significant growth of yeast only. Filamentous fungi will not be ruled out unless a specific request is made." (pick from **TEST window** keypad - **}NSGU**)	**Fungus** TEST - as per Mycology manual.

Result Category	**Reporting**			
	C&S	**C&S + routine fungus requested and no FUNGUS test ordered**	**C&S + routine fungus requested and FUNGUS test ordered**	***Cryptococcus* or specific filamentous fungus requested**
Mixed growth	"Mixed growth. Suggest repeat specimen if patient's symptoms suggest a urinary tract infection." (Pick from LIS **TEST window** keypad "**Mixed }MIXG**")	"Mixed growth. Suggest repeat specimen if patient's symptoms suggest a urinary tract infection." (Pick from LIS **TEST window** keypad "**Mixed }MIXG**")	**C&S** TEST - "Mixed growth. Suggest repeat specimen if patient's symptoms suggest a urinary tract infection." (Pick from LIS **TEST window** keypad "**Mixed }MIXG**")	**C&S** TEST - "Mixed growth. Suggest repeat specimen if patient's symptoms suggest a urinary tract infection." (Pick from LIS TEST window keypad "Mixed }MIXG")
			Fungus TEST - "Mixed growth. Suggest repeat specimen if patient's symptoms suggest a urinary tract infection." (Pick from LIS **TEST window** keypad "**Mixed }MIXG**")	**Fungus** TEST - as per Mycology manual.

Positive Culture Reporting:

Result Category	**Reporting**			
	C&S	**C&S + routine fungus requested and no FUNGUS test ordered**	**C&S + routine fungus requested and FUNGUS test ordered**	***Cryptococcus* or specific filamentous fungus requested**
Growth with workup Preliminary report	Morphologic description of organism with corresponding colony count/L - choose from LIS **ISOLATE window** keypad: **\<=10** for ≤10 x E6 cfu/L, **\<100** for 10-100 x E6 cfu/L, **\>100** for >100 x E6 cfu/L.			
Growth with workup Final report	Organism name with corresponding colony count/ L (choose from LIS ISOLATE window keypad as above) and susceptibility testing results.	Organism name with corresponding colony count/L (choose from LIS ISOLATE keypad) and susceptibility testing results. **Add** "No significant yeast isolated. Routine urine fungal cultures screen for significant growth of yeast only. Filamentous fungi will not be ruled out unless a specific request is made."(pick from **TEST window** keypad **}NYSU**)	**C&S** TEST - Organism name with corresponding colony count/L (choose from LIS ISOLATE window keypad as above) and susceptibility testing results. **Add** "No significant yeast isolated. Routine urine fungal cultures screen for significant growth of yeast only. Filamentous fungi will not be ruled out unless a specific request is made."(pick from **TEST window** keypad - **}NYSU**)	**C&S** TEST - Organism name with corresponding colony count/L (choose from LIS ISOLATE window keypad as above) and susceptibility testing results.
			Fungus TEST - (pick from **TEST window** keypad - **}NYSU**) as above	**Fungus** TEST - as per Mycology manual.

Growth of Group B streptococci from Female12-60 years:

Result Category	Reporting
Significant amount	Report as Isolate with corresponding colony count/L. Add ISOLATE Comment "This organism is intrinsically susceptible to penicillin. If treatment is required AND this patient cannot be treated with penicillin, empiric treatment with nitrofurantoin or levofloxacin is generally successful for bacteriuria. If advice regarding antimicrobial treatment is desired, please contact the medical microbiologist on-call. NOTE REGARDING PREGNANT PATIENTS: Any women with GBS bacteriuria in any concentration during her pregnancy should also receive intrapartum chemoprophylaxis. Reference: J Obs Gyn Can 2004; 26(9):826-32. If this patient is pregnant AND cannot be treated with penicillin, please contact the Microbiology Department within 48 hours for susceptibility tests to help guide intrapartum chemoprophylaxis." (Pick from LIS **ISOLATE window** keypad "**\GBSU** for female 12-60y")
Non-significant amount	Report TEST Comment: "Group B streptococcus isolated but in amounts too small to suggest a GBS urinary tract infection. However, any woman with GBS bacteriuria in any concentration during her pregnancy should receive intrapartum chemoprophylaxis. Reference: J Obs Gyn Can 2004; 26(9):826-32. This organism is intrinsically susceptible to penicillin. If this patient is pregnant AND cannot be treated with penicillin, please contact the Microbiology Department within 48 hours to request susceptibility testing." (Pick from LIS **TEST window** keypad "**Group B }GBsm**")
Mixed growth with GBS	"Mixed growth, including Group B streptococcus (GBS). Suggest repeat specimen if patient's symptoms suggest a urinary tract infection. Any women with GBS bacteriuria during her pregnancy, even in mixed growth, should receive intrapartum chemoprophylaxis. Reference: J Obs Gyn Can 2004; 26(9):826-32. This organism is intrinsically susceptible to penicillin. If this patient is pregnant AND cannot be treated with penicillin, please contact the Microbiology Department within 48 hours to request susceptibility testing." (Pick from LIS **TEST window** "**Mixed }wGBS**")

Growth of Group B streptococci from Men/Women not of Childbearing Age <12 or >60 years:

Result Category	Reporting
Significant amount	Report as Isolate with corresponding colony count/L. Add ISOLATE Comment "This organism is intrinsically susceptible to penicillin. If treatment is required AND this patient cannot be treated with penicillin, empiric treatment with nitrofurantoin or levofloxacin is generally successful for bacteriuria. If advice regarding antimicrobial treatment is desired, please contact the medical microbiologist on-call." (Pick from LIS **ISOLATE window** keypad "**GBS**")

VI. References

- Murray P.R., Baron E.J., Pfaller M.A., Yolken R.H.. 2003. Manual of Clinical Microbiology, 8th ed. ASM Press, Washington, D.C.
- Izenberg H.D.. 2003. Urine Cultures, 3.12.1 in Clinical Microbiology Procedures Handbook, 2nd ed. Vol.1 ASM Press, Washington, D.C.
- Burd, E.M., Hall, G.S., McCarter, Y.S., Zervos, M. 2009. Cumitech 2C, Laboratory Diagnosis of Urinary Tract Infections, Coordinating ed., A.S. Weissfield. ASM, Washington, D.C.

Prostatitis Work up

I. Introduction

Bacterial cultures of segmented lower urinary tract specimens can be used to differentiate urethritis/cystitis and prostatitis depending on the different quantitation of growth in the different segmented specimens.

Segmented quantitation culture specimens include initial stream sample of urine (VB1), a midstream urine sample (VB2), an aliquot of expressed prostatic secretion (EPS) and a post prostatic massage secretion (VB3).

When seminal fluid is sent with VB1, 2 or 3, it should be treated as EPS. Occasionally, only a pre-massage (VB1 or VB2) and post-massage (VB3) urine specimen will be received.

II. Specimen Collection and Transplant

See Pre-analytical Procedure - Specimen Collection QPCMI02001

III. Reagents/Materials/Media

See Analytical Process - Bacteriology Reagents_Materials_Media List QPCMI10001

IV. Procedure

A. Processing of Specimens:

See Specimen Processing Procedure

a) Direct Examination:
Gram stain: Not routinely performed. If specifically requested, perform Gram stain directly on unspun specimen.

b) Culture:

See Specimen Processing Procedure

B. Interpretation of cultures:

Examine plates after appropriate incubation time.

a) **Cultures with no growth:**

Discard no growth routine cultures after 18-24 hrs incubation. **Except**:
- Urine specimens processed after 1600 hrs (plates from the "After 4 p.m." basket) – re-incubated until 1400 hrs and re-examine
- When yeast or non-specified fungus is requested – re-incubate for another 24 hrs at room temperature.
- If colonies are too small – re-incubate for another 24hrs.

b) **Cultures with growth:**

1. For each plate, count the colonies and multiply by the appropriate dilution factor in SI units.
2. Workup cultures according to the criteria in Tables 4.

TABLE 4: Segmented Urine and Expressed Prostatic Secretion (EPS)

Inoculation Loop size	**Colony count/L**	**Work-up**
0.001 mL 0.01 mL	1 colony = 1 x 10^6 CFU/L 1 colony = 0.1 x 10^6 CFU/L	**Uropathogens:** Quantitate, ID + susceptibility **Non-uropathogens:** Quantitate, minimal workup for ID (describe in broad groups, coag neg staph, viridans strep, etc). No susceptibility

Note: Consider coagulase-negative staphylococcus as **uropathogens** only when present in amounts >10-fold more that other **non-uropathogens**.

See Identification and Methods for Common Urinary Tract Isolates for workup.

TABLE 5: Interpretation Guide for Typical Results of Segmented Urine and EPS Cultures

Pre-massage samples		Prostatic massage sample	Post-massage sample	**Possible Diagnosis**
VB1	**VB2**	**EPS**	**VB3**	
-	-	+	-	Prostatitis

Pre-massage samples		Prostatic massage sample	Post-massage sample	**Possible Diagnosis**
-	-	+	+	Prostatitis
+	+	+	+	Cystitis+Prostatitis
+	+	-	++ (10 fold >VB2)	Cystitis+Prostatitis
+	+	-	+	Urethritis/Cystitis
+	-	-	-	Contamination
-	-	-	-	No infection

+ = growth of the same isolate type in each sample

C. Susceptibility Testing:

Refer to Susceptibility Testing Manual

VI. Reporting

Segmented Urine and Expressed Prostatic Secretion for diagnosis of Prostatitis:

Direct Smear (if requested):
Gram Stain: "(No) Pus cells seen. (No) Bacteria seen" (without quantitation)

Culture:

No growth Report:

"No Growth"

Growth Report:

Growth with no work-up:

Report as TEST Comment "highest colony count - choose from LIS TEST window keypad:
}<1 for <1 x E6 cfu/L,
}<10 for 1-9 x E6 cfu/L,
}<100 for 10-100 x E6 cfu/L,
}>100 for >100 x E6 cfu/L
and Skin/Urethral Flora"

Growth with work-up:

Organism name with corresponding (highest colony count - choose from LIS ISOLATE window keypad:
\<1 for <1 x E6 cfu/L,
\<10 for 1-9 x E6 cfu/L,
\<100 for 10-100 x E6 cfu/L,
\>100 for >100 x E6 cfu/L)
and appropriate susceptibility testing results.

VII. References

- Murray P.R., Baron E.J., Pfaller M.A., Yolken R.H. 2003. Manual of Clinical Microbiology, 8th ed. ASM Press, Washington, D.C.
- Izenberg H.D. 2003. Urine Cultures, 3.12.1 in Clinical Microbiology Procedures Handbook, 2nd ed. Vol.1 ASM Press, Washington, D.C.
- Burd, E.M., Hall, G.S., McCarter, Y.S., Zervos, M. 2009. Cumitech 2C, Laboratory Diagnosis of Urinary Tract Infections, Coordinating ed., A.S. Weissfield. ASM, Washington, D.C.
- Meares E.M. Investigative Urology 1968. 5(5):492-518
- Nickel J.C. Techniques in Urology 1997. 3(10):38-43.

Appendix I – Appearance of Common Uropathogens on BUTI (Brilliance) Agar

Gram negative bacteria:

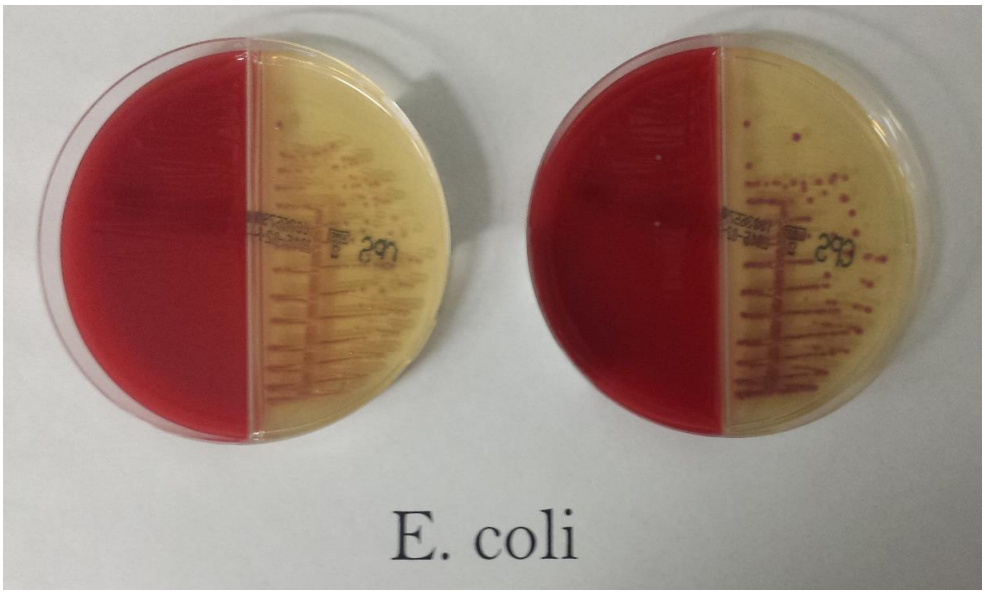

Figure 1: Left – NLF *E.coli*, Right – LF *E.coli*
Both display burgundy/pink colonies on BUTI. No growth on CNA.
Visual *E.coli* identification acceptable. No MS needed. Requires antimicrobial sensitivities if of significant amount.

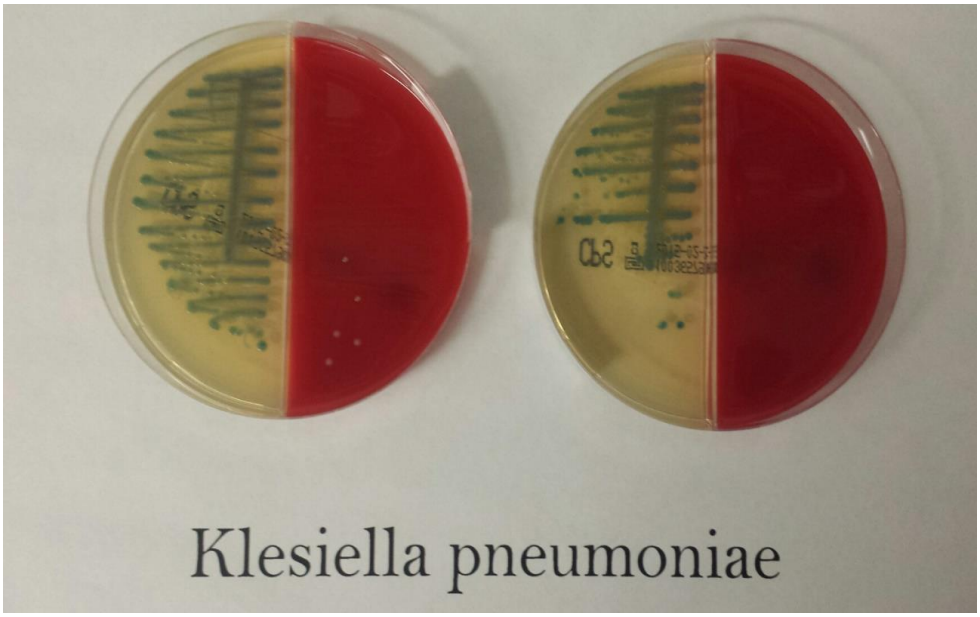

Figure 2: Left and Right – *K. pneumoniae*
Klebsiella, Enterobacter, Citrobacter display blue/green colonies on BUTI. No growth on CNA.
Requires identification and antimicrobial sensitivities if significant amount.

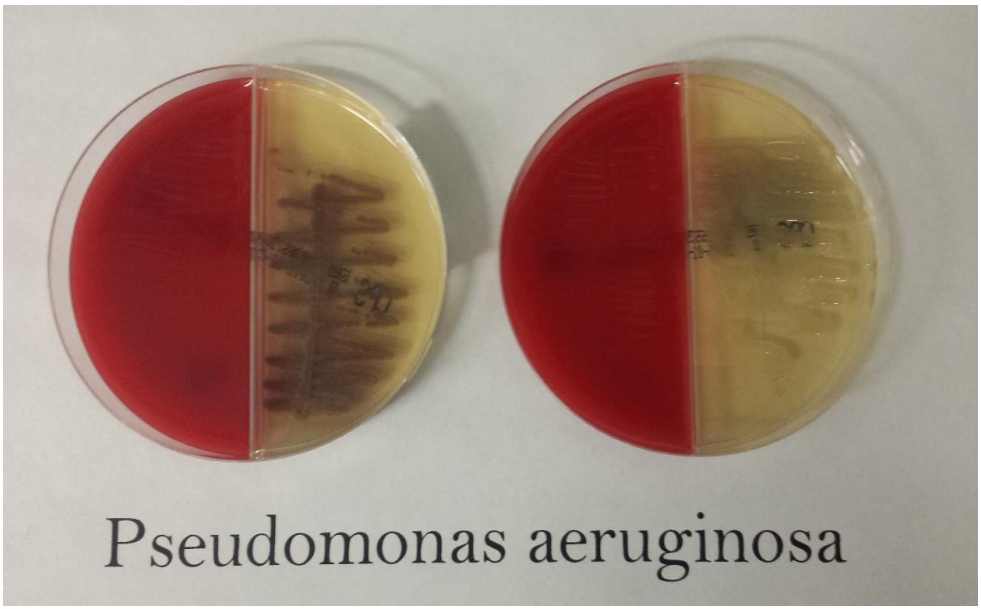

Figure 3: Left – *P. aeruginosa*, Right – mucoid *P. aeruginosa:*
Display brown/beige colonies on BUTI. No growth on CNA.

Requires identification and antimicrobial sensitivities if of significant amount.

Gram positive bacteria:

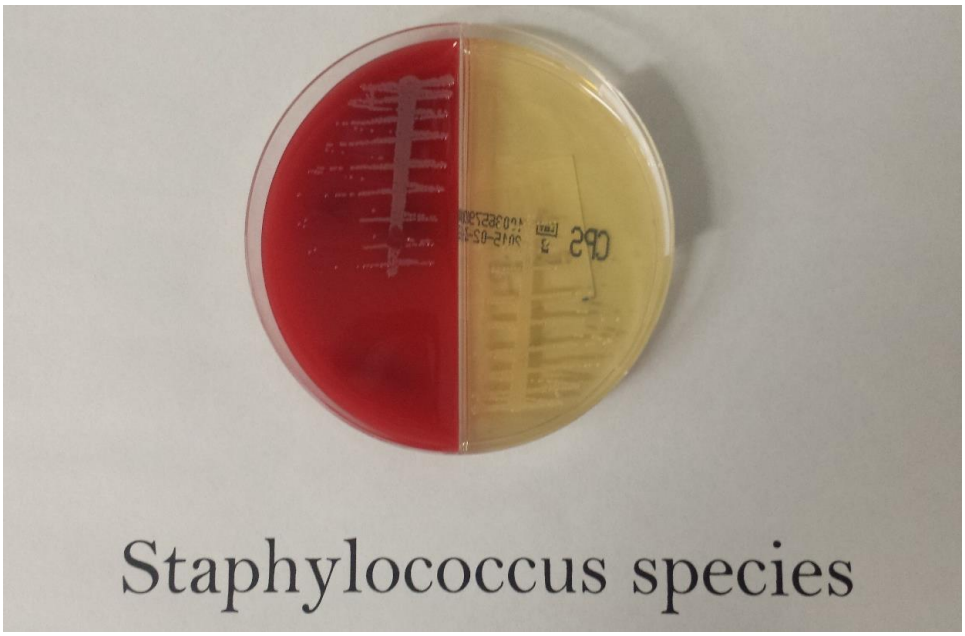

Figure 4: *Staphylococcus species*

Display colourless colonies on BUTI. Growth on CNA.
Requires identification and antimicrobial sensitivities as required.

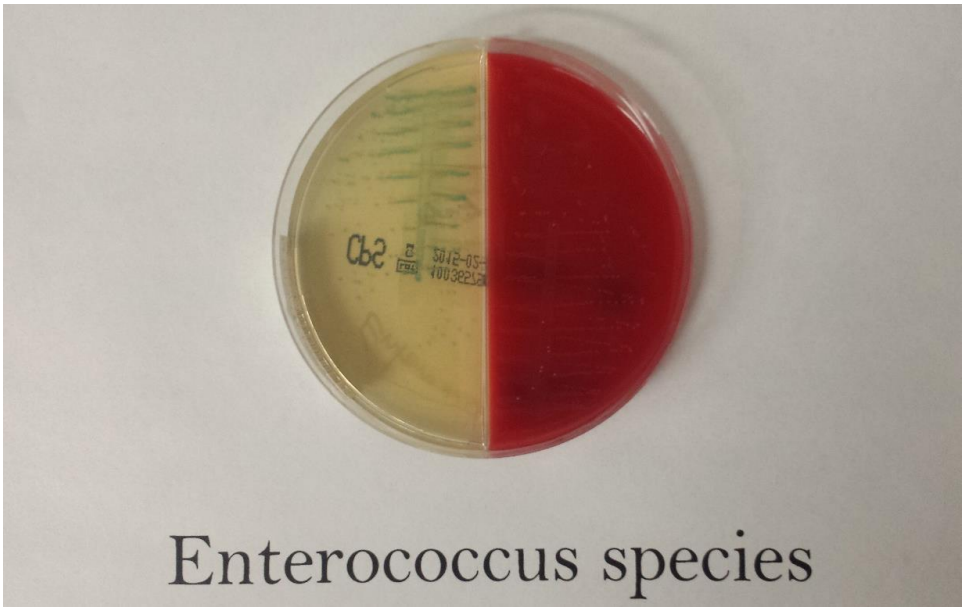

Figure 5: *Enterococcus species*
Display blue colonies on BUTI. Growth on CNA.
Requires identification and antimicrobial sensitivities.

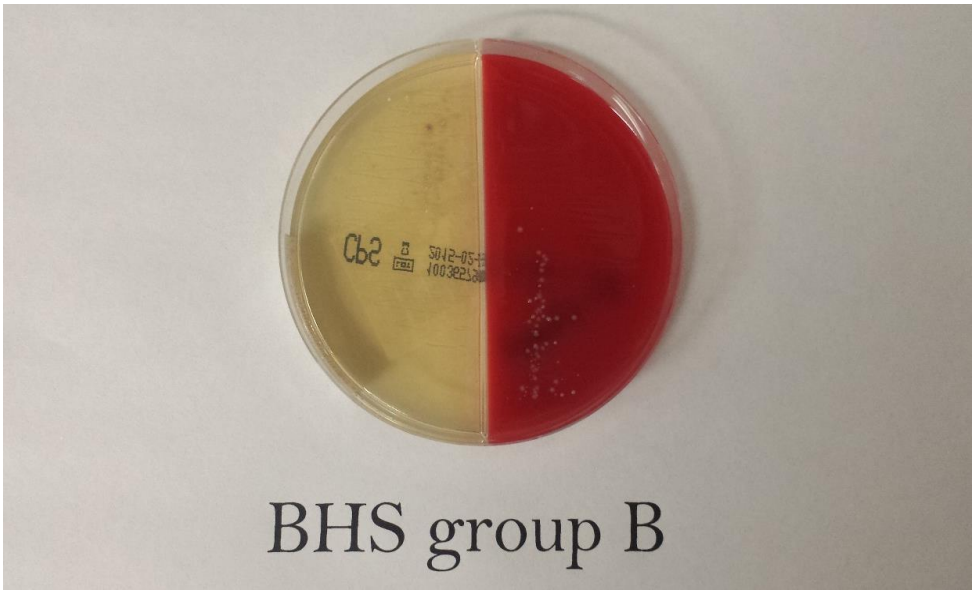

Figure 6: Beta-hemolytic streptococcus:
Display violet, blue or colourless colonies on BUTI. Growth on CNA with hemolysis.
Requires identification and antimicrobial sensitivities if requested.

Record of Edited Revisions

Manual Section Name: Urine Culture Manual

Page Number / Item	Date of Revision	Signature of Approval
Annual Review	May 26, 2004	Dr. T. Mazzulli
Annual Review	May 12, 2005	Dr. T. Mazzulli
Annual Review	April 10, 2006	Dr. T. Mazzulli
Specimen collection procedure – see Pre-analytical Procedure - Specimen Collection QPCMI02001	April 10, 2006	Dr. T. Mazzulli
Specimen processing procedure - See Specimen Processing Procedure QPCMI06003	April 10, 2006	Dr. T. Mazzulli
Modify urine category page 2	April 10, 2006	Dr. T. Mazzulli
Removed Specimen Rejection Criteria; refer to Specimen Rejection Criteria QPCMI06001	April 10, 2006	Dr. T. Mazzulli
Modified Interpretation of Culture wording Page 3	April 10, 2006	Dr. T. Mazzulli
C. urealyticum and *A. uriae* added to the ID table Page 6	April 10, 2006	Dr. T. Mazzulli
New Reporting category and phrases Page 7, 8	April 10, 2006	Dr. T. Mazzulli
New Table of Contents page	April 10, 2006	Dr. T. Mazzulli
New section and workup table for segmented urine and EPS	April 10, 2006	Dr. T. Mazzulli
Work-up any amount of beta-haemolytic strep to rule out GBS in females 12-60 years.	April 10, 2006	Dr. T. Mazzulli
Report ≥3 types of uropathogens as “mixed growth…..”	April 10, 2006	Dr. T. Mazzulli
Urine Reporting	August 03, 2006	Dr. T. Mazzulli
Prostatitis Workup Reporting	August 03, 2006	Dr. T. Mazzulli
Urine interpretation tables 1 and 2 – modified “mixed growth”	September 14, 2006	Dr. T. Mazzulli
Modified Urine “mixed growth” reporting phrase	September 14, 2006	Dr. T. Mazzulli
Annual Review	August 13, 2007	Dr. T. Mazzulli
Annual Review	August 15, 2008	Dr. T. Mazzulli
Annual Review	August 10, 2009	Dr. T. Mazzulli
Annual Review	June 18, 2010	Dr. T. Mazzulli
GBS reporting phrases	June 18, 2010	Dr. T. Mazzulli
Suprapubic/Asceptically collected urine processing to 10uL and 100uL loops	June 18, 2010	Dr. T. Mazzulli

Page Number / Item	Date of Revision	Signature of Approval
Annual Review	June 20, 2011	Dr. T. Mazzulli
Annual Review	June 30, 2012	Dr. T. Mazzulli
Annual Review	August 25, 2013	Dr. T. Mazzulli
Modify Headers Modify Table of Contents Annual Review	June 11, 2014	Dr. T. Mazzulli
Add on *Streptococcus anginosus* group and *Streptococcus gallolyticus as* non-uropathognes	December 23, 2014	Dr. T. Mazzulli
Addition of Appendix 1	February 1, 2015	Dr. T. Mazzulli
Addition of link Urine Hold to work up Annual Review	April 30, 2015	Dr. T. Mazzulli
Annual Review Update CPS4 to Brilliance BUTI media Updated UHN/MSH logo in header	April 20, 2016	Dr. T. Mazzulli
Removed Asymptomatic Bacteriuria - Urine hold study link. Study transferred to routine specimen processing manual. Replaced link with one to specimen processing manual.	January 31, 2017	Dr. T. Mazzulli
Annual Review	April 20, 2017	Dr. T. Mazzulli
Annual Review	April 15, 2018	Dr. T. Mazzulli
Annual Review Minor format change	September 14, 2019	Dr. T. Mazzulli
Annual review	September 25, 2020	Dr. T. Mazzulli

Full document review included in all updates. Bi-annual review conducted when no revision had been made within 2 years.

Page Number / Item	Date of Revision	Edited by:
Removed reincubate additional 24hr for suprapubic/yeast fungus request. Specified beta-hem strep in list of uropathogens	January 21, 2021	Dorna Zareianjahromi
Minor formatting change	April 11, 2021	Jessica Bourke
Nomenclature update – Enterobacterales	April 19, 2021	Wayne Chiu
Added Aerococcus sanguinicola as possible uropath	May 19, 2022	Wayne Chiu
Added bladder irrigation sample to table 2 workup	Sep 2, 2022	Wayne Chiu