Application of PCR Testing for Women's Health in a Primary Care Setting

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Disclosures

We confirm that we have no financial interests, relationships, affiliations, or other commitments that could be perceived as a conflict of interest with respect to this presentation.

Learning Objectives

- Define PCR testing, the advantages over conventional lab tests, and the population of discussion.
- Apply the interpretation of PCR results and correct choice of antimicrobial therapy.
- Describe the CDC Designation of Mycoplasma and as an STI, signs and symptoms, and transmission.
- Discuss three female health case studies and one male case utilizing PCR testing and pharmacological treatment modalities.
- Question and Answer

Practice Model

- Kentucky Racing Health Services Center
- Kentucky Racing Health and Welfare Fund
- APRN Managed Faculty Practice
- Primary Care, Women's Health, & Mental Health

KRHSC

KENTUCKY RACING HEALTH SERVICES CENTER

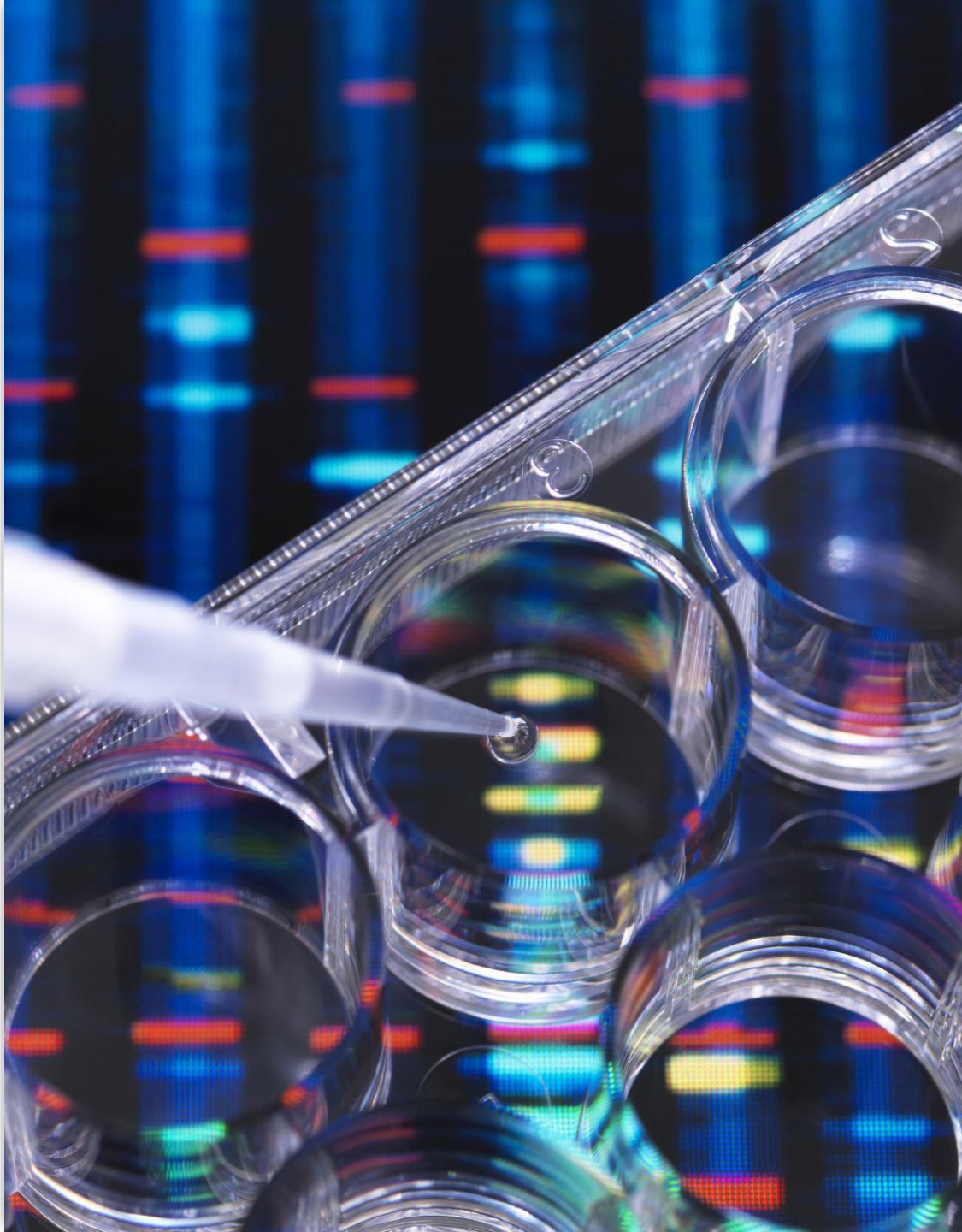
Population

- At Risk Population
- Social Determinants of Health
  - Housing, language barriers, financial, access to care, trust
- **Cultural Influences**
  - **Collectivism:** Emphasis on community and collective well-being.
  - **Mutual Support:** Strong community networks that provide mutual support and assistance.
- Practice Inquiry
  - Patients with urinary/STI symptoms negative workups
  - Lengthy/Costly workups that did not always identify any etiology
  - WHNP's review of the literature

J.Iwelunmor & C. Airhihenbuwa, 2017

Polymerase Chain Reaction (PCR) Testing

- PCR testing is a molecular biology technique used to amplify and detect specific DNA sequences.
- PCR testing differs from traditional testing methods in several significant ways, primarily due to its ability to amplify small amounts of DNA and detect specific genetic material.



ChatGPT. (2024, July 15). Define PCR Testing . OpenAI.

PCR vs. Traditional Testing

Aspect	PCR Testing	Traditional Testing
Sensitivity and Specificity	Highly sensitive and specific, can detect small amounts of DNA/RNA.	Less sensitive and specific, may require higher pathogen concentrations.
Speed and Efficiency	Results within a few hours after sample processing.	Can take several days to weeks (e.g., bacterial cultures).
Type of Data	Provides molecular data by detecting specific genetic sequences.	Often provides phenotypic data, such as pathogen growth or presence of antigens/antibodies.
Quantification	qPCR can quantify the amount of DNA/RNA present (viral load/bacterial count).	Generally qualitative, indicating presence/absence of pathogen.
Automation and Throughput	Highly automated, allowing high-throughput processing of many samples.	More labor-intensive and time-consuming, especially for culture-based methods.
Applications	Detecting viruses, bacteria, fungi, genetic testing, forensic analysis, research.	Clinical diagnostics (bacterial infections, serology, rapid antigen tests).
Preparation and Handling	Requires careful handling to prevent contamination.	More robust handling but requires proper techniques (e.g., aseptic techniques).
Examples	COVID-19 RT-PCR test, HIV viral load testing, genetic testing for inherited diseases.	Bacterial culture for strep throat, rapid influenza antigen test, tuberculin skin test.

ChatGPT. (2024, July 15). Table comparing PCR testing to traditional testing. OpenAI

Interpretation of PCR Results

- Main Driver of our desire for PCR Testing
- Current lab service did not offer sensitivity reports for traditional testing
  - Specific to our practice: Mycoplasma and Ureaplasma
- PCR testing develops a sensitivity report based on the DNA of the isolated bacteria
  - Contributes to antibiotic stewardship

Example of Sensitivity Report

Genitourinary Infection Pathogens Detected	Results	Microbial Load*
Bacterial Pathogens		
Mycoplasma hominis	Detected	Low
Ureaplasma parvum	Detected	High
Ureaplasma urealyticum	Detected	Low
Bacterial Vaginosis Pathogens		
Atopobium vaginae	Detected	High
BVAB 2,3 (bacterial vaginosis associated bacteria 2,3); Mobiluncus spp	Detected	High

! Bacterial vaginosis: In symptomatic patients, detected bacteria with high sensitivity (>90%) for bacterial vaginosis include Atopobium spp, Gardnerella vaginosis, and Megasphaera spp. Detected bacteria with high specificity (>90%) for bacterial vaginosis include BVAB 2,3; and Mobiluncus spp. Preferred treatment includes **metronidazole, clindamycin, tinidazole, or secnidazole.** **

Quick Summary Antibiotic Table Legend:
(++): BEST ACTIVITY
(+): GOOD ACTIVITY
(±): VARIABLE ACTIVITY

		M genitalium, M. hominis	Ureaplasma spp
Fluoroquinolones	Levofloxacin (po/OP/IV)	±	+
	Moxifloxacin (po/OP/IV)	++	+
Macrolides	Azithromycin (po/IV/OP)	++	++

! **Quick Summary Table** above shows potentially effective [illegible] antibiotic(s) for the [illegible] noted bacteria (assumes mono-antimicrobial therapy, unless otherwise specified). Detected antimicrobial resistance gene(s) (as applicable) has(have) been integrated into antibiotic selection. Based on patient-specific clinical data, multi-antimicrobial therapy might be indicated in some cases (see Summary Antibiogram below).***

Antimicrobial Resistance Genes Detected	Results
tet B, tet M	Detected

! Potential resistance to **tetracycline, doxycycline, minocycline.**

Mycoplasma & Ureaplasma: POLL

Respond online at PollEv.com/kristaroach639

Respond via text messaging

- Text KRISTAROACH639 to 22333 to join the session
- Then text A (yes), B (no), C (unsure)

Mycoplasma genitalium (*Mgen*)

- 1980s – men with NGU
- Bacterial STI spread through sexual contact and vertical transmission from mother to fetus
- Affects men & women, but specifically for women:
  - Often asymptomatic
  - Vaginal discharge, dysuria, pelvic pain, dyspareunia, bleeding after sex, irregular menses
  - 10-30% clinical cervicitis
  - 4-22% PID
  - 2-fold increased risk cervicitis, PID, preterm delivery, spontaneous abortion, and infertility; associated w/ chorioamnionitis, LBW
- Very slow growing organism - can take 6 months w/ traditional culture
- 2019 - NAAT for *M. genitalium* is FDA cleared for use with urine and urethral, penile meatal, endocervical, and vaginal swab samples
- OR --> PCR testing!
- If testing is not available, you should suspect *Mgen* in recurrent cervicitis, PID

CDC, 2021; Martinez-Adorno, M., 2024

Mycoplasma genitalium (*Mgen*)

- Lacks cell wall: ß-lactams including penicillins and cephalosporins are ineffective
- High rates of macrolide resistance with treatment failures: 1-g dose of azithromycin should not be used
- Use resistance-guided treatments
- All sexual partners in past 60 days should be referred for evaluation and treatment

- **Doxycylcine 100mg PO BID x 7 days followed by azithromycin 1g PO initial dose followed by 500mg PO daily x 3 days**

- **IF MACROLIDE RESISTANT: Doxycylcine 100mg PO BID x 7 days followed by moxifloxicin 400mg PO daily x 7 days**

CDC, 2021

Ureaplasma parvum and *U. urealyticum*

- 1954 – men with NGU
- Bacteria commonly found in lower urogenital tracts, but overgrowth can lead to infection needing treatment
- Transmitted through sexual contact and vertical transmission from mother to fetus
- 40-80% lower genital tract of sexually active females w/ *U. parvum* > *U. Urealyticum*
- Vaginal discharge, dysuria, pelvic pain, dyspareunia, bleeding after sex, irregular menses
- Vaginitis, cervicitis, BV, pelvic infections, infertility, chorioamnionitis, UTIs, preterm delivery, spontaneous abortion, LBW

CDC, 2021; Matasariu et al., 2022

Ureaplasma parvum and *U. urealyticum*

- Lacks cell wall…
- All sexual partners in past 60 days should be referred for evaluation and treatment

- **Doxycylcine 100mg PO BID x 7 days**
- **Azithromycin 1g PO x 1**

Waites & Ambalavanan, 2023

Case Studies

Case #1: Subjective Data

- 25-Year-Old Latina Female
- **CC:** Recurrent vaginal infections (BV)
- **HPI:** Patient reports she has recurrent vaginal infections. She has had three in the last year. She states she takes all the medicine she is given, and the infection keeps coming back. She thinks she has another infection today. She has the same grayish white milky vaginal d/c with a strong fishy odor.
- She also desires pregnancy and had a spontaneous abortion a year ago and has not had success in getting pregnant again.
- **Social Hx:** Denies ETOH, smoking, illicit drug use; Married and monogamous; works as hotwalker at the track
- **Med/Surg Hx:** spontaneous AB
- **Vaccination Status:** She did receive her HPV vaccinations at age 12

Case #1: Objective Data

- General: Normotensive, in no acute distress
- Abdomen: Soft, no tenderness, no masses
- Pelvic:
  - External genitalia: vulva w/o lesions/discolorations, normal hair pattern
  - Vagina: moist, rugated, **slight erythema, moderate white/gray milky malodorous discharge**
  - Cervix: pink, no lesions, nulliparous os, no CMT, no discharge
  - Groin: No lymphadenopathy bilaterally
- Skin: no rashes, no lesions noted
- POCT urine HCG negative
- **WHIFF +**

Case #1: Plan

https://www.healthtrackrx.com/our-menus/#Genito

Urethritis / Discharge + Vaginitis

SPECIMEN TYPES: *Cervical/Vaginal/Cervicovaginal/Endometrial, Vulva/Labia/Vestibule/Perineal, Urine (voided)*

COMMON SIGNS & SYMPTOMS: Consider if patient has pain with urination, pruritus, burning, urethral discharge, vaginal discharge, odor, itching and/or discomfort, or recurrent vaginitis.

Bacterial
Atopobium vaginae
BVAB2, 3 (Bacterial vaginosis-associated bacteria 2, 3); Mobiluncus spp.
Chlamydia trachomatis
Gardnerella vaginalis
Megasphaera (types 1, 2)
Mycoplasma genitalium
Mycoplasma hominis
Neisseria gonorrhoeae
Ureaplasma urealyticum
Ureaplasma parvum

Viral
Herpes simplex virus 1
Herpes simplex virus 2

Protozoal
Trichomonas vaginalis

Fungal
Candida albicans, parapsilosis, tropicalis
Candida glabrata
Candida krusei

Resistance
dfr (A1, A5), sul (1, 2)
ermB, C; mefA
tet B, tet M

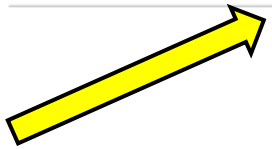
ADD-ON: High Risk HPV types 16, 18, 45

Case #1: PCR Results

Genitourinary Infection + Lesions Pathogens Detected	Results	Copies/mL*	Microbial Load* *Approximate copies of target nucleic acid per mL (Low: <100,000; Moderate:100,000-3.9 Million; High: >3.9Million)
Bacterial Pathogens			
Ureaplasma parvum	Detected	25,000,000	High
Bacterial Vaginosis Pathogens			
BVAB 2,3 (bacterial vaginosis associated bacteria 2,3); Mobiluncus spp	Detected	2,100,000	Moderate
Gardnerella vaginalis	Detected	13,000,000	High

Case #1: Treatment

Bacterial Vaginosis: In symptomatic patients, detected bacteria with high sensitivity (>90%) for bacterial vaginosis include Atopobium spp, Gardnerella vaginosis, and Megasphaera spp. Detected bacteria with high specificity (>90%) for bacterial vaginosis include BVAB 2,3; and Mobiluncus spp. Preferred treatment includes **metronidazole, clindamycin, tinidazole, or secnidazole.** **



Quick Summary Antibiotic Table Legend:
(++): BEST ACTIVITY
(+): GOOD ACTIVITY
(±): VARIABLE ACTIVITY

		Ureaplasma spp
Fluoroquinolones	Ciprofloxacin (po/OT/OP/IV)	+
	Ofloxacin (po/OT/OP)	+
	Levofloxacin (po/OP/IV)	+
	Moxifloxacin (po/OP/IV)	+

Quick Summary Table above shows potentially effective oral antibiotic(s) for the above-noted bacteria (assumes mono-antimicrobial therapy, unless otherwise specified). Detected antimicrobial resistance gene(s) (as applicable) has(have) been integrated into antibiotic selection. Based on patient-specific clinical data, multi-antimicrobial therapy might be indicated in some cases (see Summary Antibiogram below).***

Case #2: Subjective Data

- 45-year-old Latina female
- **CC:** Annual women's health exam, fasting labs and DM education.
- **HPI:** Taking chronic disease meds as prescribed, has c/o itchy, vaginal discharge and dysuria. Checking blood sugars at 11:30 every day (2 hours PP) = 210-220.
- **Social Hx:** Denies ETOH, smoking, illicit drug use; not married/in monogamous relationship x 7 years, no condoms; works as hotwalker at the track
- **Med/Surg Hx:** uncontrolled DM, HTN, hyperlpidemia, nephrectomy, CKD stage 3, tubal ligation
  - G3 P2 A1 L 2 (2 c/s births and no pregnancy/delivery complications)
- **Preventative care:** up to date on mammogram, colon cancer screening, last pap 8/2023 ASCUS/negative HPV
- **Vaccination status:** has never had HPV vaccination
- **Current Medications:**
  - Losartan 25mg PO daily
  - Rosuvastatin 5mg PO daily
  - Ozempic .5mg weekly

Case #2: Subjective Data - ROS

- General: Denies fever, fatigue, change in weight, change in appetite.
- GU: **dysuria, back pain x 1 week;** Denies frequency, urgency, hematuria.
- Gyn: LMP 6/24/24, last 15 days (longer than normal for her), **itchy white vaginal discharge,** Denies dysmenorrhea, bleeding after intercourse, dyspareunia, pelvic pain.

Case #2: Objective Data

- General: Normotensive, well-appearing, A&O x 3, no acute distress
- Abdomen: Soft, no tenderness, no masses, no CVA tenderness
- Pelvic**:**
  - *External genitalia:* hair pattern evenly distributed, labia symmetric, no erythema, no edema, no excoriation
  - *Vagina:* moist, rugated, pink/**slightly erythematous in areas, moderate amt. white,thick non-odorous discharge adhered to vaginal walls**
  - *Cervix:* pink, patent multipararous os, no discharge, no lesions, no CMT, **small amount white, thick discharge adherent to surface**
  - *Groin:* no lymphadenopathy bilaterally

Case #2: Subjective Data - POCT

POCT U/A results: yellow, turbid, slight odor

Glu - >/= 1000 mg/dL

Bili - neg

Ket - neg

SG - 1.020 **Blood - trace-lysed**

pH - 6.0 **Pro - >/= 300 mg/dL**

Uro - 0.2 E.U./dL

Nit - positive

Leu - neg

POCT urine HCG negative

POCT HbA1c =12.2

MDCalc:

44 mL/min - Creatinine clearance, original Cockcroft-Gault

Case #2: Plan

- **Vaginal discharge, dysuria, back pain**
  - PCR for STI
  - Stressed condom use
- **UTI**
  - Cephalexin 500mg BID x 5 days
- **Vaginal Candidiasis**
  - Fluconazole 150mg by mouth-take once

PCR Panel Genitourinary

URINARY TRACT INFECTION

Bacterial
Acinetobacter baumannii
Citrobacter freundii
Enterobacter cloacae complex, Klebsiella (Enterobacter) aerogenes
Enterococcus faecalis, faecium
Escherichia coli
Klebsiella pneumoniae, oxytoca
Morganella morganii
Pseudomonas aeruginosa
Serratia marcescens
Staphylococcus aureus
Staphylococcus epidermidis, haemolyticus, lugdunensis
Staphylococcus saprophyticus
Streptococcus agalactiae (Group B Strep)
Streptococcus pyogenes (Group A Strep)
Ureaplasma parvum
Ureaplasma urealyticum

Fungal
Candida albicans, parapsilosis, tropicalis
Candida glabrata
Candida krusei

Fungal
Slow Growing
Streptococcus Species
Not Typically Tested by Culture

Urethritis / Discharge + Vaginitis

SPECIMEN TYPES: *Cervical/Vaginal/Cervicovaginal/Endometrial, Vulva/Labia/Vestibule/Perineal, Urine (voided)*

COMMON SIGNS & SYMPTOMS: Consider if patient has pain with urination, pruritus, burning, urethral discharge, vaginal discharge, odor, itching and/or discomfort, or recurrent vaginitis.

Bacterial
Atopobium vaginae
BVAB2, 3 (Bacterial vaginosis-associated bacteria 2, 3); Mobiluncus spp.
Chlamydia trachomatis
Gardnerella vaginalis
Megasphaera (types 1, 2)
Mycoplasma genitalium
Mycoplasma hominis
Neisseria gonorrhoeae
Ureaplasma urealyticum
Ureaplasma parvum

Viral
Herpes simplex virus 1
Herpes simplex virus 2

Protozoal
Trichomonas vaginalis

Fungal
Candida albicans, parapsilosis, tropicalis
Candida glabrata
Candida krusei

Resistance
dfr (A1, A5), sul (1, 2)
ermB, C; mefA
tet B, tet M

ADD-ON: High Risk HPV types 16, 18, 45

https://www.healthtrackrx.com/our-menus/#Genito

Case #2: PCR Results

Genitourinary Infection Pathogens Detected	Results	Microbial Load*
Bacterial Pathogens		
Ureaplasma parvum	Detected	High
Escherichia coli	Detected	Low

Quick Summary Antibiotic Table Legend:
(++): BEST ACTIVITY
(+): GOOD ACTIVITY
(±): VARIABLE ACTIVITY

		Ureaplasma spp	Escherichia coli
Fluoroquinolones	Ciprofloxacin (po/OT/OP/IV)	+	+
	Ofloxacin (po/OT/OP)	+	+
	Levofloxacin (po/OP/IV)	+	+
	Moxifloxacin (po/OP/IV)	+	+
Macrolides	Azithromycin (po/IV/OP)	++	±

! **Quick Summary Table** above shows potentially effective oral antibiotic(s) for the above-noted bacteria (assumes mono-antimicrobial therapy, unless otherwise specified). Detected antimicrobial resistance gene(s) (as applicable) has(have) been integrated into antibiotic selection. Based on patient-specific clinical data, multi-antimicrobial therapy might be indicated in some cases (see Summary Antibiogram below).***

Antimicrobial Resistance Genes Detected	Results
tet B, tet M	Detected

! Potential resistance to **tetracycline, doxycycline, minocycline**.

Comprehensive PCR information

PERSONALIZED SUMMARY ANTIBIOGRAM

Antibiotic Table Legend:
(++): BEST ACTIVITY, >90% of bacterial cultural isolates are sensitive.
(+): GOOD ACTIVITY, 70-90% of bacterial cultural isolates are sensitive.
(±): VARIABLE ACTIVITY, 50-70% of bacterial cultural isolates are sensitive.
(0): Non-Recommended antimicrobial;
Note: Personalized (patient specific) data included in this report, are a correlation of detected microbes and antimicrobial resistance genes (if any), with national antimicrobial sensitivity data.
Administration Mode: po = oral, IV = intravenous, IM = intramuscular, OP = ophthalmic, OT = otic.
Some antibiotics might not be available in the US (see www.pdr.net, www. drugs.com, or www.rxlist.com for current information).

		Ureaplasma spp	Escherichia coli
Penicillins	Ampicillin (IV/IM/po)	0	±
	Amoxicillin (po)	0	±
	Amoxicillin Clavulanic acid (po)	0	+
	Ampicillin Sulbactam (IV/IM)	0	+
	Piperacillin Tazobactam (IV)	0	+
Carbapenems	Doripenem (IV)	0	+
	Ertapenem (IV/IM)	0	+
	Imipenem (IV/IM)	0	+
	Imipenem Cilastatin Relebactam (IV)	0	+
	Meropenem (IV)	0	+
	Meropenem Vaborbactam (IV)	0	+
Monobactam	Aztreonam (IV/IM)	0	+
Fluoroquinolones	Ciprofloxacin (po/OT/OP/IV)	+	+
	Delafloxacin (po/IV)	0	+
	Ofloxacin (po/OT/OP)	+	+
	Levofloxacin (po/OP/IV)	+	+
	Moxifloxacin (po/OP/IV)	+	+
	Norfloxacin (po)	0	+
	Gemifloxacin (po)	0	+
	Gatifloxacin (OP)	0	+
Parenteral Cephalosporins	Cefazolin (IV/IM)	0	+
	Cefotetan (IV/IM)	0	+
	Cefoxitin (IV)	0	+
	Cefuroxime (po/IV/IM)	0	+
	Cefotaxime (IV/IM)	0	+
	Ceftizoxime (IV/IM)	0	+
	Ceftriaxone (IV/IM)	0	+
	Ceftazidime (IV/IM)	0	+
	Cefepime (IV/IM)	0	+
	Ceftazidime Avibactam (IV)	0	+
	Ceftaroline (IV)	0	+
	Ceftobiprole (IV)	0	+
	Ceftolozane Tazobactam (IV)	0	+
	Cefiderocol (IV)	0	+
Oral Cephalosporins	Cefadroxil (po)	0	±
	Cephalexin (po)	0	±
	Cefaclor (po)	0	±
	Cefprozil (po)	0	+
	Cefuroxime Axetil (po/IV/IM)	0	+
	Cefixime (po)	0	+
	Ceftibuten (po)	0	+
	Cefpodoxime (po)	0	+
	Cefdinir (po)	0	+
Aminoglycosides	Gentamicin (IV/IM/OP)	0	+
	Tobramycin (IV/IM/OP)	0	+
	Amikacin (IV/IM)	0	+
	Plazomicin (IV)	0	+
Macrolides	Erythromycin (po/IV/OP)	0	0
	Azithromycin (po/IV/OP)	++	±
	Clarithromycin (po)	+	0
Tetracyclines	Eravacycline (IV)	0	+
	Omadacycline (po/IV)	0	+
Glycylcycline	Tigecycline (IV)	0	+
Polymyxin Peptides	Polymyxin B (IV/IM/OP)	0	+
	Colistin (IV/IM/OT)	0	+
Peptidyl transferase inhibitor	Chloramphenicol (OP)	0	+
DHFR inhibitor/ sulfonamide combination	Trimethoprim Sulfamethoxazole (Bactrim)(po/IV)	0	±
Nitrofuran	Nitrofurantoin (Macrobid) (po)	0	+
Phosphidic acid derivative	Fosfomycin (IV)	0	+
	Fosfomycin (po)	0	+

Case #3: Subjective

- 29-year-old Latina female
- **CC:** malodorus, yellow vaginal discharge
- **HPI:** 8 days of discharge, denies any history STI
- **Social Hx:** Denies ETOH, smoking, illicit drug use; single; sexually active w/ 2 male partners without condoms; works as hotwalker at the track
- **Med and Surgical Hx:** allergic rhinitis
  - G1 P1 A0 L1 (1 c/s births and no pregnancy/delivery complications)
- **Preventative care:** last pap 10/2022 negative/negative HPV
- **Vaccination status:** has never had HPV vaccination
- **Current Medications:** cetirizine 10mg daily, Nexplanon (placed 1/2023)

Case #3: Subjective Data - ROS

- General: Denies fever, fatigue, change in weight, change in appetite.
- GU: Denies dysuria, frequency, urgency, hematuria.
- Gyn: LMP 2/2023 (Nexplanon in place), **yellow malodorous discharge,** Denies dysmenorrhea, bleeding after intercourse, dyspareunia, pelvic pain.

Case #3: Objective Data

- General: Normotensive, well-appearing, A&O x 3, no acute distress
- Abdomen: Soft, no tenderness, no masses, no CVA tenderness
- Pelvic**:**
  - *External genitalia:* shaven, labia symmetric, no erythema, no edema, no excoriation
  - *Vagina:* moist, pink, rugated, **small amt. thin, white/yellow malodorous discharge**
  - *Cervix:* pink, patent multipararous os, no discharge, no lesions, no CMT
  - *Groin:* no lymphadenopathy bilaterally

- Wet mount: **too numerous to count WBC**, **+Whiff, +clue cells**, - hyphae, ? trich

Case #3: Plan

- **Bacterial vaginosis**
  - Metronidazole 500mg PO BID x 7 days, No ETOH/no sex during treatment
  - Stressed condom use
  - PCR for STI

Case #2: Plan

Atopobium vaginae

Candida albicans, parapsilosis, tropicalis

Candida krusei

Gardnerella vaginalis

Morganella morganii

Mycoplasma hominis

Staphylococcus saprophyticus

Ureaplasma parvum

Streptococcus pyogenes (Group A strep)

Citrobacter freundii

Enterococcus spp (faecalis, faecium)

Klebsiella spp (pneumoniae, oxytoca)

Pseudomonas aeruginosa

Staphylococcus aureus

ACT, MIR, FOX, ACC Groups

CTX-M1 (15), M2 (2), M9 (9), M8/25 Groups

OXA-48, 51

ermB, C; mefA

tet B, tet M

VanA, VanB

BVAB 2,3 (bacterial vaginosis associated bacteria 2,3); Mobiluncus spp

Candida glabrata

Chlamydia trachomatis

Megasphaera (Types 1, 2)

Mycoplasma genitalium

Neisseria gonorrhoeae

Trichomonas vaginalis

Ureaplasma urealyticum

Acinetobacter baumannii

Enterobacter cloacae complex, Klebsiella aerogenes

Escherichia coli

Proteus spp (mirabilis, vulgaris)

Serratia marcescens

Streptococcus agalactiae (Group B Strep)

SHV, KPC Groups

IMP, NDM, VIM Groups

qnrA1, qnrA2, qnrB2

mecA

dfr (A1, A5), sul (1,2)

High Risk HPV types 16, 18, 45

Case #3: PCR Results

Genitourinary Infection Pathogens Detected	Results	Microbial Load*
Bacterial Pathogens		
Chlamydia trachomatis	Detected	Detected
! Preferred (primary) treatment includes **azithromycin or doxycycline (amoxicillin in pregnancy)**. Alternate treatment includes **erythromycin, ofloxacin, or levofloxacin** (see Summary Antibiogram below, if applicable). **		
Mycoplasma hominis	Detected	Low
Staphylococcus coagulase-negative spp (Methicillin Resistant, MRSE)	Detected	Low
! **Methicillin Resistant (mec A gene detected) Staphylococcus spp (coagulase negative; MRCoNS) identified in this sample.** Part of a given body site's normal flora, but can be pathogenic in some clinical settings (immunocompromised patients, bite/foreign material wounds, and various transcutaneous catheter placements (urinary bladder/IV catheters, CNS shunts, etc)). If clinically indicated, and no pertinent resistance genes are present, preferred antibiotics for MRSE include **Vancomycin, Linezolid, Daptomycin, Fusidic acid, Telavancin, Quinupristin/dalfopristin, Ceftaroline, Tedizolid, Dalbavancin, or Oritavancin** (see Summary Antibiogram below, if applicable). **		
Ureaplasma parvum	Detected	High
Ureaplasma urealyticum	Detected	Low
Bacterial Vaginosis Pathogens		
BVAB 2,3 (bacterial vaginosis associated bacteria 2,3); Mobiluncus spp	Detected	High
Gardnerella vaginalis	Detected	Moderate
! Bacterial Vaginosis: In symptomatic patients, detected bacteria with high sensitivity (>90%) for bacterial vaginosis include Atopobium spp, Gardnerella vaginosis, and Megasphaera spp. Detected bacteria with high specificity (>90%) for bacterial vaginosis include BVAB 2,3; and Mobiluncus spp. Preferred treatment includes **metronidazole, clindamycin, tinidazole, or secnidazole.** **		

Case #3: PCR Results

Quick Summary Antibiotic Table Legend:
(++): BEST ACTIVITY
(+): GOOD ACTIVITY
(±): VARIABLE ACTIVITY

		Chlamydia trachomatis	M. genitalium, M. hominis	S. coag-negative spp (MRSE)	Ureaplasma spp
Fluoroquinolones	Levofloxacin (po/OP/IV)	++	±	±	+
	Moxifloxacin (po/OP/IV)	+	++	±	+

! **Quick Summary Table** above shows potentially effective oral antibiotic(s) for the above-noted bacteria (assumes mono-antimicrobial therapy, unless otherwise specified). Detected antimicrobial resistance gene(s) (as applicable) has(have) been integrated into antibiotic selection. Based on patient-specific clinical data, multi-antimicrobial therapy might be indicated in some cases (see Summary Antibiogram below).***

Antimicrobial Resistance Genes Detected	**Results**
ermB, C; metA	Detected
! Potential resistance to the **macrolide, lincosamide, and streptogramin** antibiotics.	
mecA	Detected
! Potential resistance to **methicillin, carbapenems, cephalosporins, penicillins, and beta-lactamase inhibitors.**	
tet B, tet M	Detected
! Potential resistance to **tetracycline, doxycycline, minocycline**.	

PERSONALIZED SUMMARY ANTIBIOGRAM

Antibiotic Table Legend:

(++): BEST ACTIVITY, >90% of bacterial cultural isolates are sensitive.
(+): GOOD ACTIVITY, 70-90% of bacterial cultural isolates are sensitive.
(±): VARIABLE ACTIVITY, 50-70% of bacterial cultural isolates are sensitive.
(0): Non-Recommended antimicrobial;

Note: Personalized (patient specific) data included in this report, are a correlation of detected microbes and antimicrobial resistance genes (if any), with national antimicrobial sensitivity data.

Administration Mode: po = oral, IV = intravenous, IM = intramuscular, OP = ophthalmic, OT = otic.
Some antibiotics might not be available in the US (see www.pdr.net, www. drugs.com, or www.rxlist.com for current information).

		Chlamydia trachomatis	M. genitalium, M. hominis	S. coag-negative spp (MRSE)	Ureaplasma spp
Penicillins	Ampicillin (IV/IM/po)	+	0	0	0
	Amoxicillin (po)	+	0	0	0
Fluoroquinolones	Ciprofloxacin (po/OT/OP/IV)	0	0	0	+
	Delafloxacin (po/IV)	0	0	+	0
	Ofloxacin (po/OT/OP)	++	0	0	+
	Levofloxacin (po/OP/IV)	++	±	±	+
	Moxifloxacin (po/OP/IV)	+	++	±	+
	Gemifloxacin (po)	+	0	0	0
	Gatifloxacin (OP)	+	+	0	0
Aminoglycosides	Gentamicin (IV/IM/OP)	0	0	±	0
Tetracyclines	Eravacycline (IV)	0	0	+	0
	Omadacycline (po/IV)	0	0	+	0
Glycylcycline	Tigecycline (IV)	0	0	+	0
Glycopeptides Lipopeptide Lipoglycopeptide	Daptomycin (IV)	0	0	++	0
	Vancomycin (po/IV/OP)	0	0	++	0
	Telavancin (IV)	0	0	+	0
	Oritavancin (IV)	0	0	+	0
	Dalbavancin (IV)	0	0	+	0
Oxazolidinones	Linezolid (po/IV)	0	0	++	0
	Tedizolid (po/IV)	0	0	+	0
Peptidyl transferase inhibitor	Chloramphenicol (OP)	0	0	+	0
DHFR inhibitor/ sulfonamide combination	Trimethoprim Sulfamethoxazole (Bactrim)(po/IV)	0	0	+	0
Phosphidic acid derivative	Fosfomycin (IV)	0	0	±	0
Streptogramin Combination	Quinupristin Dalfopristin (IV)	0	0	+	0

Male Case: Subjective Data

- 31-Year-Old Male
- Speaks Spanish
- **Chief Concern:** Privates
- **HPI**: Has an irritation when he is having sexual intercourse with wife. This has been going on for about two months. He uses baby wipes and helps. It burns and itches while he is having sex with her. The irritated area leaves these bumps on the shaft of his penis. Wants to make sure it is not syphilis. His wife has these bumps to between her legs. He denies the possibility of an STD in his behalf or his partners.
- **ROS:**
  - GI/GU: **+Burning with Urination**; Denies suprapubic pain, penile drainage, constipation, diarrhea, abdominal pain
- **Social Hx**: Heterosexual, new baby at home, exercise rider
- **Med / Surg Hx**: Unremarkable
- **Medications:** Reviewed & Up-to-date. He takes no medicines.

Male Case: Objective Data

- **Male Exam**: Shaft of the penis with 5-7 flat lesions that are slightly pink. Areas of red irritated skin in the inguinal areas. No penile drainage or chancres noted. Pt. is not circumcised. Testicular exam unremarkable without nodules.
- **Urine POCT**: Negative

PCR Panel GU Infection + Lesion

Genitourinary Infection + Lesion

SPECIMEN TYPES: *Cervical/Vaginal/Cervicovaginal/Endometrial, Genital Ulcer/Lesion, Rectal/Anal, Oropharynx/Throat/Oral*

COMMON SIGNS & SYMPTOMS: Consider if patient presents with dysuria, hematuria, urgency of urination, frequency of micturition, fever, or abdominal pain.

Bacterial
Acinetobacter baumannii
Atopobium vaginae
BVAB2, 3 (Bacterial vaginosis-associated bacteria 2, 3); Mobiluncus spp.
Chlamydia trachomatis
Citrobacter freundii
Enterobacter cloacae complex, Klebsiella (Enterobacter) aerogenes
Enterococcus faecalis, faecium
Escherichia coli
Gardnerella vaginalis
Haemophilus ducreyi
Klebsiella pneumoniae, oxytoca
Megasphaera (types 1, 2)
Morganella morganii
Mycoplasma genitalium
Mycoplasma hominis
Neisseria gonorrhoeae
Proteus mirabilis, vulgaris
Pseudomonas aeruginosa
Serratia marcescens
Staphylococcus aureus
Staphylococcus epidermidis, haemolyticus, lugdunensis
Staphylococcus saprophyticus
Streptococcus agalactiae (Group B Strep)
Streptococcus pyogenes (Group A Strep)
Treponema pallidum (Syphilis)
Ureaplasma parvum
Ureaplasma urealyticum

Viral
Herpes simplex virus 1
Herpes simplex virus 2
Mpox (Monkeypox)
Varicella zoster virus (Human Herpesvirus 3, VZV)

Protozoal
Trichomonas vaginalis

Fungal
Candida albicans, parapsilosis, tropicalis
Candida glabrata
Candida krusei

Resistance
ACT, MIR, FOX, ACC Groups
CTX-M1 (15), M2 (2), M9 (9), M8/25 Groups
dfr (A1, A5), sul (1, 2)
ermB, C; mefA
IMP, NDM, VIM Groups
mecA
OXA-48, OXA-51
qnrA1, A2, B2
SHV, KPC Groups
tet B, tet M
VanA, VanB

ADD-ON: High Risk HPV types 16, 18, 45

https://www.healthtrackrx.com/our-menus/#Genito

Male Case PCR Results

Genitourinary Infection + Lesions Pathogens Detected	Results	Microbial Load*
Viral Pathogens		
High Risk HPV types 16, 18, 45	Detected	Detected

! **HPV types 16, 18, 45: One or more HPV High Risk Type(s) within this group is(are) identified in this sample. HealthTrackRx High Risk HPV assay** was designed, validated, and intended for medically indicated diagnostic purposes. Medical indications include high-risk patient history, cervicitis, vaginitis, cervicovaginal lesions, penile lesions, other genital area lesions, anorectal lesions, select extra-genital site lesions (oral, pharynx, etc...), history of recent abnormal Pap smear, recent abnormal cervical/vaginal biopsy, etc...

Male Case: Plan

- Address risks of anal/rectal and penile cancer
- Approximately 90% of anal cancers in men are associated with HPV and of those with HPV, 90% are due to HPV 16 and 18.
- Derm for Bx
- Complete STI workup
  - Swab all orifices
  - Oral Exam for Oral Cancer Screening

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