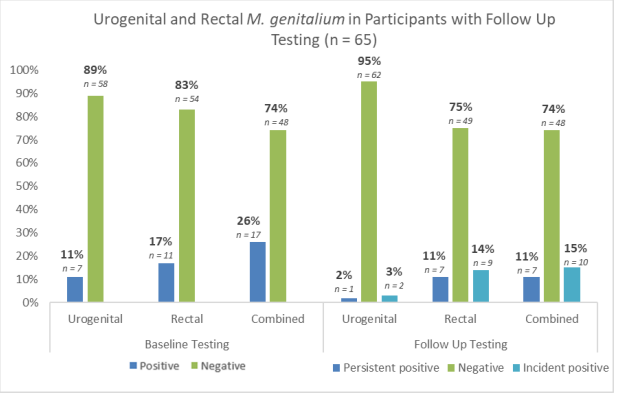
Figure 2. Detection of urogenital and rectal M. genitalium among participants with baseline and follow up testing



Conclusion. In this cohort of MSM with a recent diagnosis of a bacterial STI, routine testing identified urogenital or rectal *M. gen* in 24% of participants at baseline and 31% at either baseline or follow-up. The association of persistent *M. gen* with the risk for subsequent symptomatic infection and drug resistance merits further investigation.

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164. Antimicrobial Susceptibility of Urogenital and Extragenital *Neisseria gonorrhoeae* Isolates Among Men Who Have Sex with Men – SURRG and eGISP, 2018–2019

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Background. Extragenital gonococcal infections are common among men who have sex with men (MSM); however, data comparing antimicrobial susceptibilities of urogenital and extragenital *Neisseria gonorrhoeae* isolates are limited. We investigated differences in gonococcal antimicrobial susceptibility by anatomic site among cisgender MSM using specimens collected through CDC's enhanced Gonococcal Isolate Surveillance Project (eGISP) and Strengthening the U.S. Response to Resistant Gonorrhea (SURRG).

Methods. During January 1, 2018–December 31, 2019, 12 eGISP and 8 SURRG sites collected urogenital, pharyngeal, and rectal isolates from cisgender MSM in STD clinics. Gonococcal isolates were sent to regional laboratories for antimicrobial susceptibility testing by agar dilution. To account for correlated observations, linear mixed-effects models were used to calculate geometric mean minimum inhibitory concentrations (MICs) and mixed-effects logistic regression models were used to calculate the proportion of isolates with elevated or resistant MICs; comparisons were made across anatomic sites.

Results. Participating clinics collected 3,974 urethral, 1,553 rectal, and 1,049 pharyngeal isolates from 5,456 unique cisgender MSM. There were no significant differences in the geometric mean MICs for azithromycin, ciprofloxacin, penicillin, and tetracycline by anatomic site. For cefixime and ceftriaxone, geometric mean MICs for pharyngeal isolates were higher compared to anogenital isolates ($p< 0.05$). The proportion of isolates with elevated ceftriaxone MICs (≥ 0.125 µg/ml) at the pharynx (0.67%) was higher than at rectal (0.13%) and urethral (0.18%) sites ($p< 0.05$).

Table 1. Comparison* of antimicrobial susceptibility distribution by antimicrobial and anatomic site of gonococcal infection among men who have sex with men — eGISP and SURRG, 2018–2019

Antimicrobial and measured parameter**	Pharyngeal (n=1,049)	Rectal (n=1,553)	Urethral (n=3,974)	P-value
Azithromycin				
Geometric mean MIC (95% CI)	0.32 (95% CI: 0.30-0.34)	0.31 (95% CI: 0.29-0.33)	0.30 (95% CI: 0.29-0.31)	0.27
Number (%; 95% CI) with elevated MIC	124/1,049 (11.2%; 95% CI: 9.4-13.3)	182/1,553 (11.3%; 95% CI: 9.8-13.1)	420/3,974 (10.2%; 95% CI: 9.3-11.3)	0.38
Cefixime				
Geometric mean MIC (95% CI)	0.0192 (95% CI: 0.0185-0.020)	0.0181 (95% CI: 0.0175-0.0187)	0.0176 (95% CI: 0.0173-0.018)	**<0.001**
Number (%; 95% CI) with elevated MIC	3/1,049 (0.29%; 95% CI: 0.09-0.88)	8/1,553 (0.52%; 95% CI: 0.26-1.0)	11/3,974 (0.28%; 95% CI: 0.15-0.50)	0.41
Ceftriaxone				
Geometric mean MIC (95% CI)	0.0108 (95% CI: 0.0103-0.0113)	0.00987 (95% CI: 0.0095-0.0102)	0.0098 (95% CI: 0.0096-0.0101)	**<0.001**
Number (%; 95% CI) with elevated MIC	7/1,049 (0.67%; 95% CI: 0.32-1.4)	2/1,553 (0.13%; 95% CI: 0.03-0.51)	7/3,974 (0.18%; 95% CI: 0.08-0.37)	**0.03**
Ciprofloxacin				
Geometric mean MIC (95% CI)	0.12 (95% CI: 0.10-0.15)	0.11 (95% CI: 0.09-0.13)	0.12 (95% CI: 0.10-0.13)	0.50
Number (%; 95% CI) with resistant MIC	450/1,049 (42.7%; 95% CI: 39.5-46.0)	649/1,553 (41.6%; 95% CI: 38.9-44.2)	1701/3,974 (42.6%; 95% CI: 40.9-44.3)	0.77
Penicillin				
Geometric mean MIC (95% CI)	0.63 (95% CI: 0.58-0.68)	0.60 (95% CI: 0.57-0.65)	0.66 (95% CI: 0.63-0.69)	0.08
Number (%; 95% CI) with resistant MIC	140/1,049 (13.0%; 95% CI: 11.0-15.2)	200/1,553 (12.6%; 95% CI: 11.0-14.4)	603/3,974 (14.8%; 95% CI: 13.7-16.0)	0.06
Tetracycline				
Geometric mean MIC (95% CI)	1.55 (95% CI: 1.44-1.68)	1.48 (95% CI: 1.39-1.58)	1.47 (95% CI: 1.40-1.53)	0.45
Number (%; 95% CI) with resistant MIC	377/1,049 (35.7%; 95% CI: 32.7-38.8)	512/1,553 (32.9%; 95% CI: 30.5-35.4)	1377/3,974 (34.5%; 95% CI: 32.9-36.1)	0.31

Abbreviations: eGISP= enhanced Gonococcal Isolate Surveillance Project; SURRG= Strengthening the U.S. Response to Resistant Gonorrhea; MIC= minimum inhibitory concentration; CI= Confidence interval

*We fitted overall models with and without "anatomic sites" and compared the two models to get the overall p-value; if the overall p-value was statistically significant (<0.05), we conducted post-hoc testing to adjust for multiple tests using the Holm adjustment. Linear mixed-effects model was used for geometric mean MICs and mixed-effects logistic regression model was used for the proportion of isolates with elevated or resistant MICs across anatomic sites, respectively, to account for the multiple isolates provided by the same patients.

**Clinical and Laboratory Standards Institute (CLSI) has not established criteria for resistance to azithromycin, cefixime, and ceftriaxone; breakpoints used to define "elevated MIC" for these antimicrobials include: azithromycin MIC of ≥2.0 µg/ml, cefixime MIC of ≥0.25 µg/ml, and ceftriaxone MIC of ≥0.125 µg/ml. Antimicrobial susceptibility testing results were interpreted according to criteria recommended by CLSI for penicillin resistance (MIC ≥ 2 µg/ml or β-lactamase positive), ciprofloxacin resistance (MIC ≥1.0 µg/ml), and tetracycline resistance (MIC ≥2.0 µg/ml). Tested ranges for antimicrobials (µg/ml): azithromycin (0.008–16), cefixime (0.002–1), ceftriaxone (0.001–1), ciprofloxacin (0.001–32), penicillin (0.008–64), tetracycline (0.06–64).

Conclusion. Based on data collected from multi-jurisdictional sentinel surveillance projects, antimicrobial susceptibility patterns of *N. gonorrhoeae* isolates may differ among MSM at extragenital sites, particularly at the pharynx. Continued investigation into gonococcal susceptibility patterns by anatomic site may be an important strategy to monitor and detect the emergence of antimicrobial resistant gonorrhea over time.

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165. Emergence of Extensively Drug-Resistant *Salmonella enterica* Serotype Typhi Infections—United States, 2008–2020

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Background. Typhoid fever, caused by *Salmonella* Typhi, is fatal in 12%–30% of patients not treated with appropriate antibiotics. In 2016, a large outbreak of extensively drug-resistant (XDR) Typhi infections began in Pakistan with cases reported globally, including the United States. In 2021, the Centers for Disease Control and Prevention (CDC) issued a health advisory on XDR infections among U.S. residents without international travel. We describe resistance of Typhi infections diagnosed in the United States to help guide treatment decisions.

Methods. Typhoid fever is a nationally notifiable disease. Health departments report cases to CDC through the National Typhoid and Paratyphoid Fever Surveillance system. Isolates are submitted to the National Antimicrobial Resistance Monitoring System for antimicrobial susceptibility testing (AST) using broth microdilution. AST results are categorized by Clinical and Laboratory Standards Institute criteria. We defined XDR as resistant to ceftriaxone, ampicillin, chloramphenicol, and co-trimoxazole, and nonsusceptible to ciprofloxacin.

Results. During 2008–2019, of 4,637 Typhi isolates, 52 (1%) were ceftriaxone resistant (axo-R); 71% were ciprofloxacin nonsusceptible, 1 azithromycin resistant (azm-R), and none meropenem resistant. XDR was first detected in 2018, in 2% of 474 isolates and increased to 7% of 535 in 2019. Of the 52 axo-R isolates, 46 were XDR, of which 45 were from travelers to Pakistan, and one from a non-traveler; 6 were not XDR, of which 4 were linked to travel to Iraq. In preliminary 2020 reports, 23 isolates were XDR; 14 were from travelers to Pakistan, 8 from non-travelers, and 1 from someone with unknown travel status. Among those with XDR infection, median age was 11 years (range 1–62), 54% were female, and 62% were from 6 states.

Conclusion. Ceftriaxone-resistant Typhi infections, mostly XDR, are increasing. Clinicians should ask patients with suspected Typhi infections about travel and adjust treatment based on susceptibility results. Carbapenem, azithromycin, or both may be considered for empiric therapy of typhoid fever among travelers to Pakistan or Iraq and in uncommon instances when persons report no international travel. Ceftriaxone is an empiric therapy option for travelers to countries other than Pakistan and Iraq.