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Antimicrobial resistance in pharyngeal *Neisseria gonorrhoeae* infection: A cross-sectional study in England

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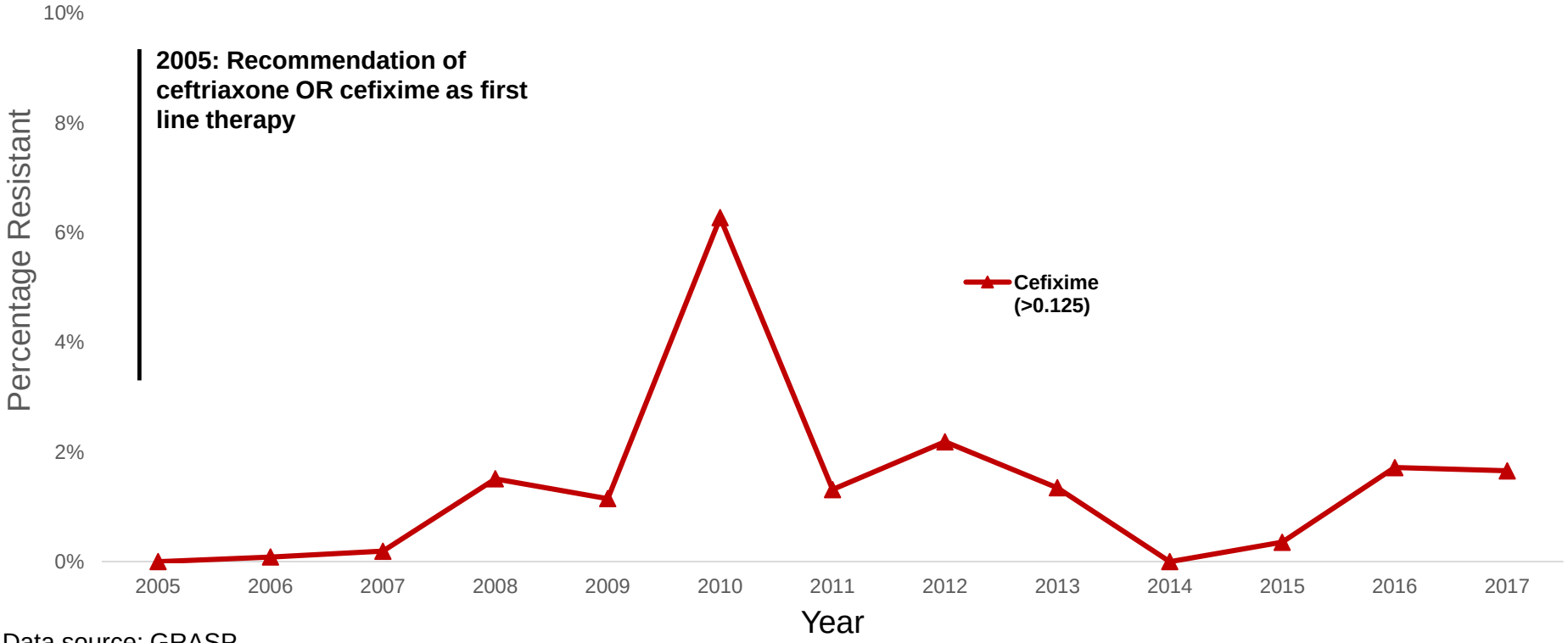
Blood Safety, Hepatitis, Sexually Transmitted Infections (STI) and HIV Service
Public Health England

Background – increasing *Neisseria gonorrhoeae* AMR



Data source: GRASP

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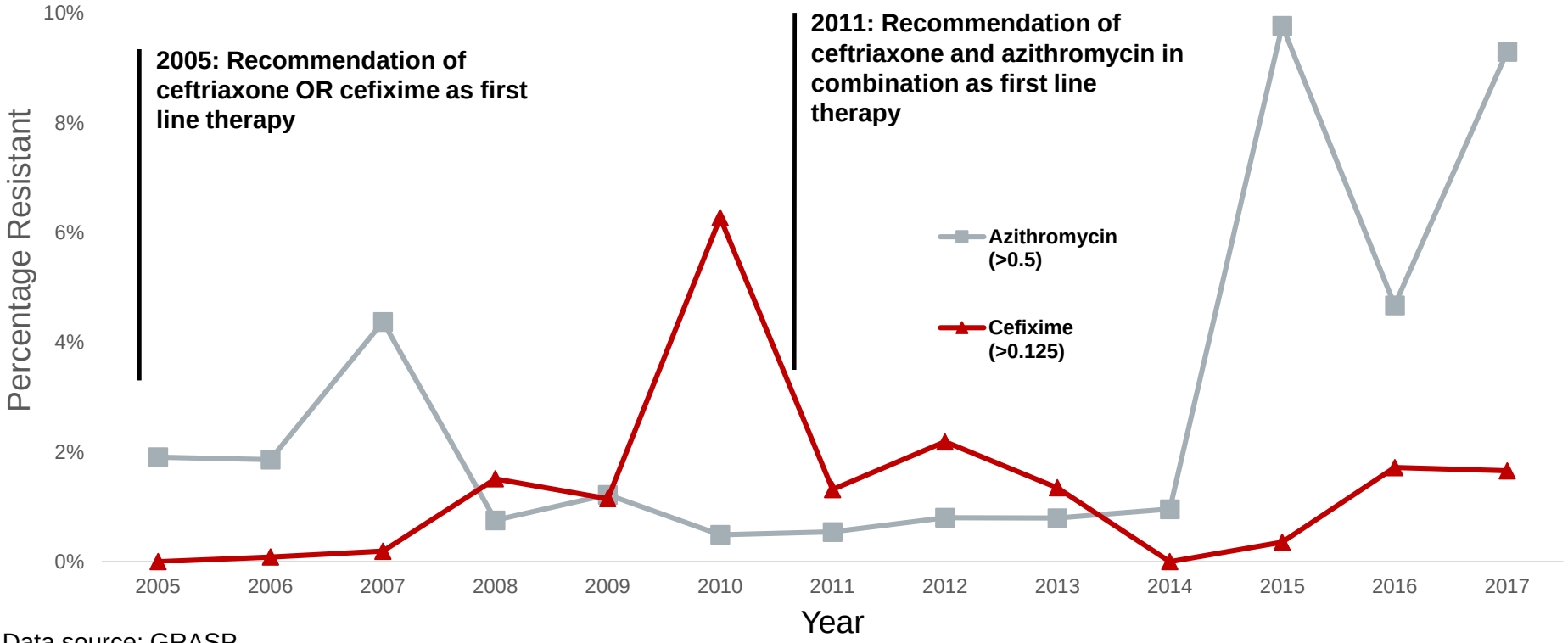

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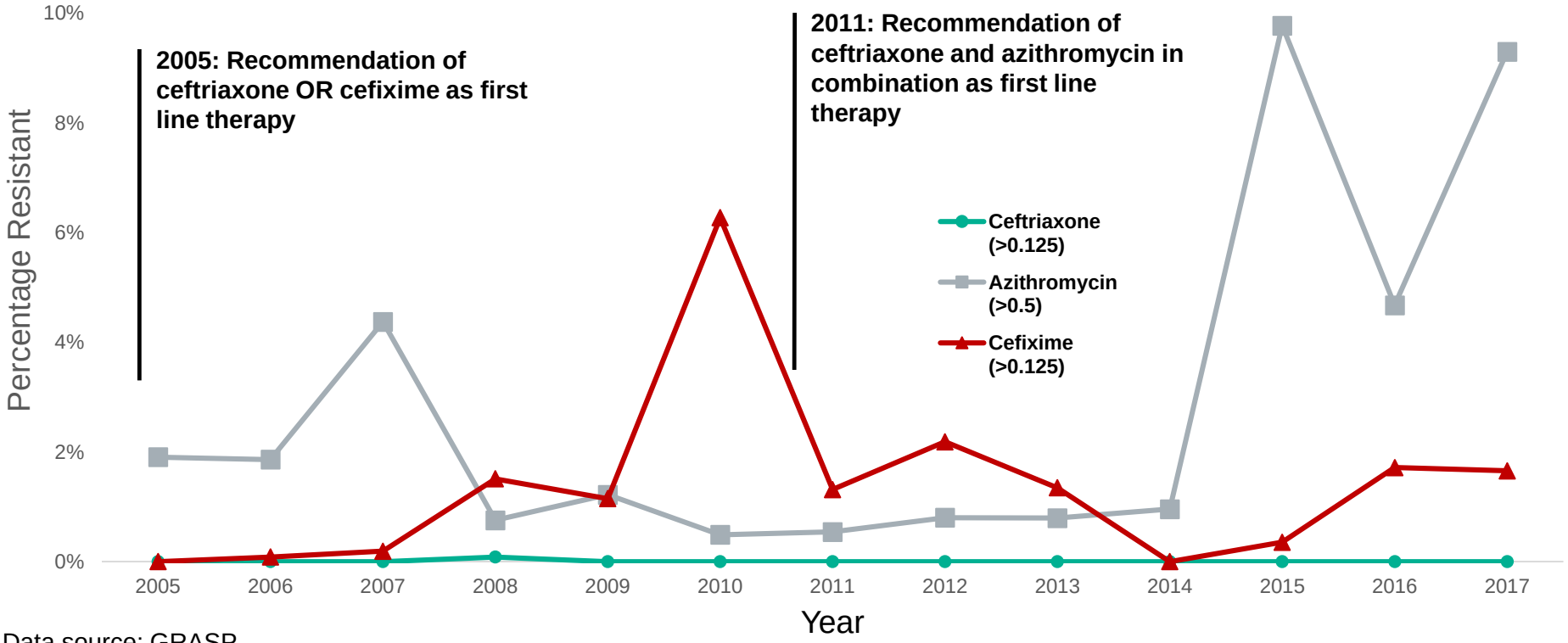

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Background – why is site of infection important?

- Gonorrhoea is concentrated among specific population groups, especially gay, bisexual and other men who have sex with men (MSM). 67% of diagnoses are made among MSM.

- Genital gonorrhoea is most commonly diagnosed but is also common in the rectum and pharynx.

- Pharyngeal infections disproportionally effect MSM, with 48% of diagnoses in this group in the pharynx.

- Pharyngeal infection is often asymptomatic and thought to be more difficult to treat compared to other infection sites.

Objectives

To investigate the association between site of infection and reduced susceptibility to antimicrobials in MSM and heterosexual men and women

Methods – antimicrobials considered

We used data collected in GRASP from 2012 to 2017.

We look at the association between resistance or reduced susceptibility to three antimicrobials and site of infection.

Antimicrobial	Resistance threshold (minimum inhibitory concentration (MIC))
Azithromycin	**MIC >0.5 mg/L**
Cefixime	**MIC >0.125 mg/L**
Ceftriaxone	**MIC ≥ 0.015 mg/L**

In samples collected from the pharynx and urethra from men who have sex with men and heterosexual men and women.

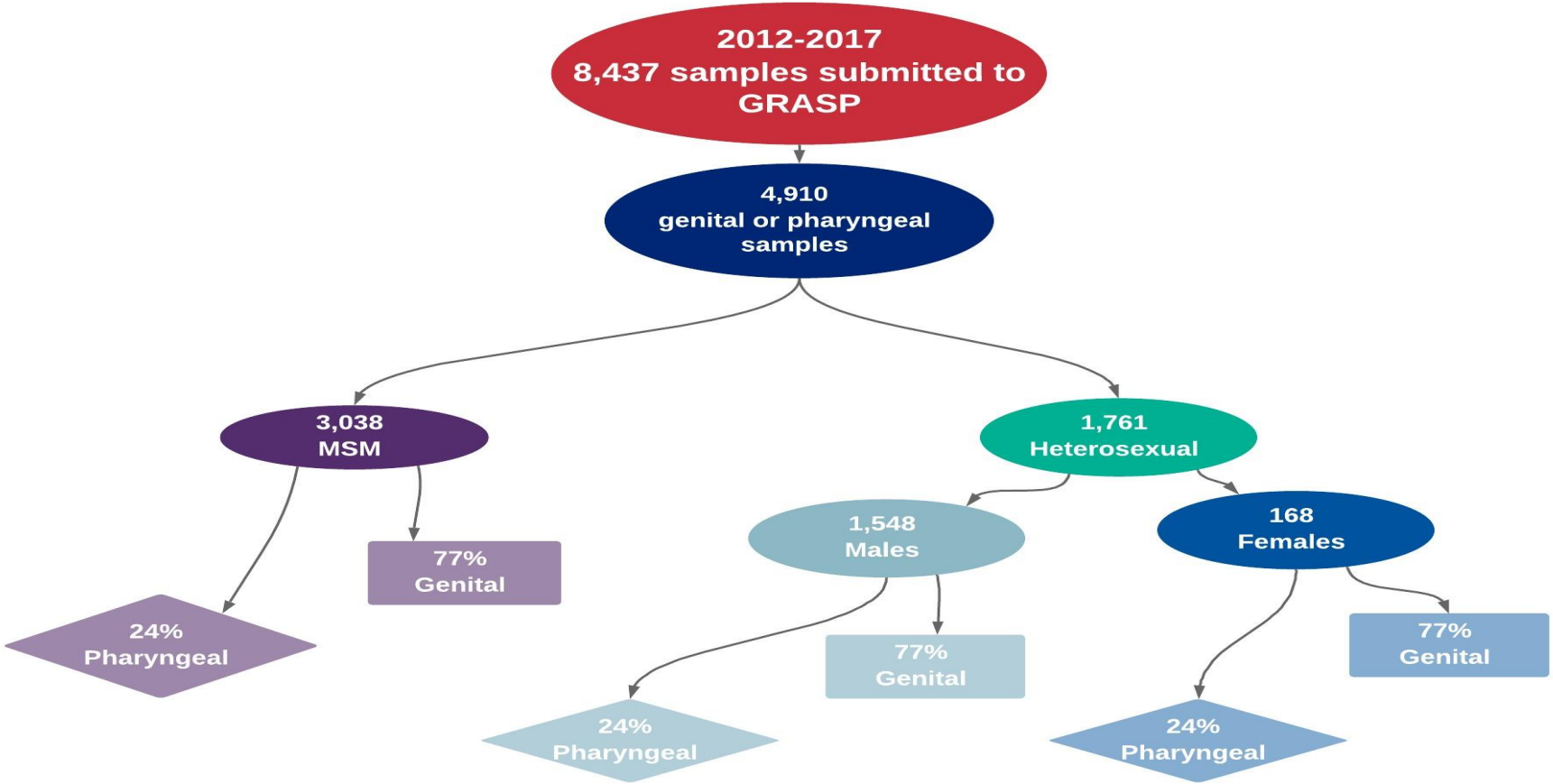
Methods – Statistical methods

Bivariate analysis was used to test for an association between antimicrobial resistance and:

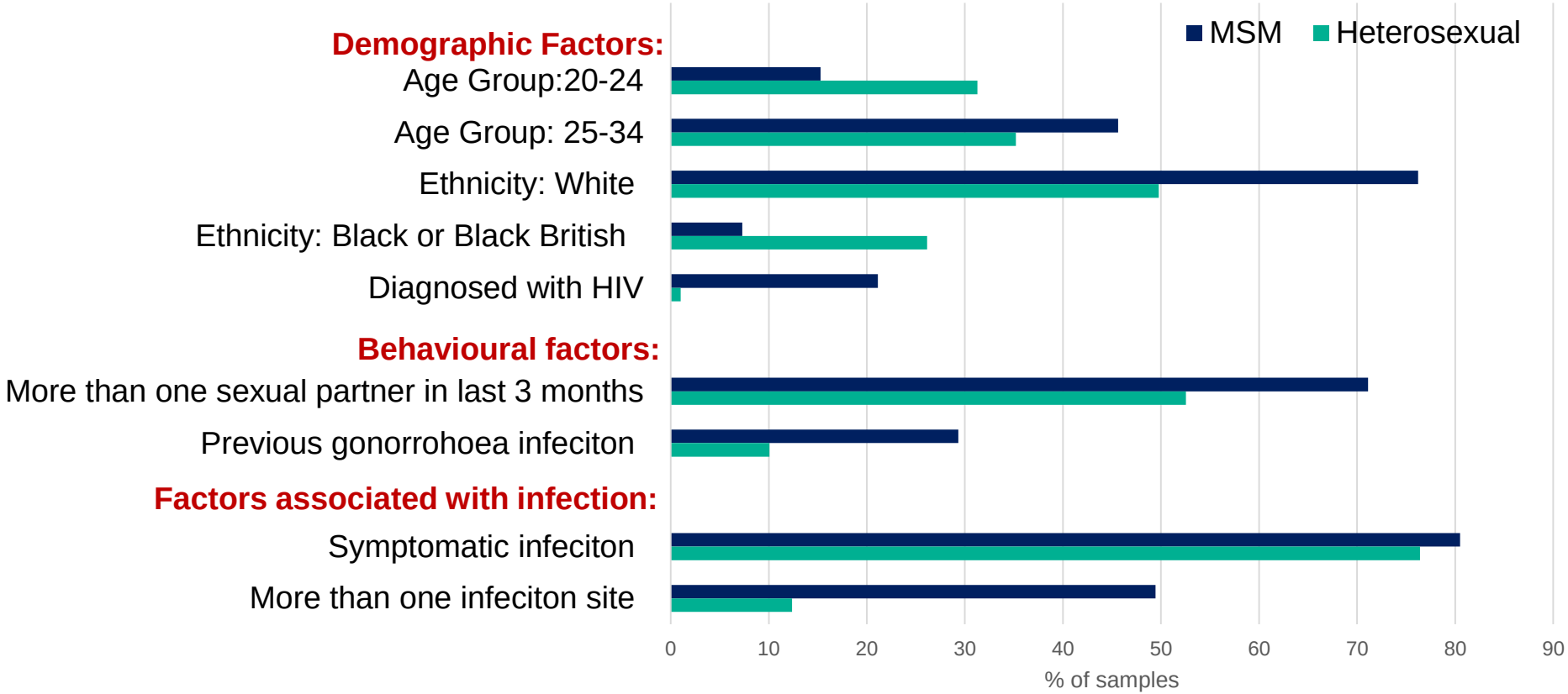
- **Factors associated with infection:**
  - **Site of infection**
  - **Number of infection sites at time of gonorrhoea diagnosis**
  - **The presence of symptoms**
- **Demographic factors:**
  - **Age group**
  - **Ethnicity**
- **Behavioural factors:**
  - **HIV status**
  - **Number of sexual partners**
  - **Concurrent STI at the time of gonorrhoea diagnosis**
  - **Previous gonorrhoea diagnosis**

A multivariable logistic regression was used to adjust for factors with a significant association between site of infection and AMR.

Results: samples by site of infection and sexual orientation



Results: Patient characteristics



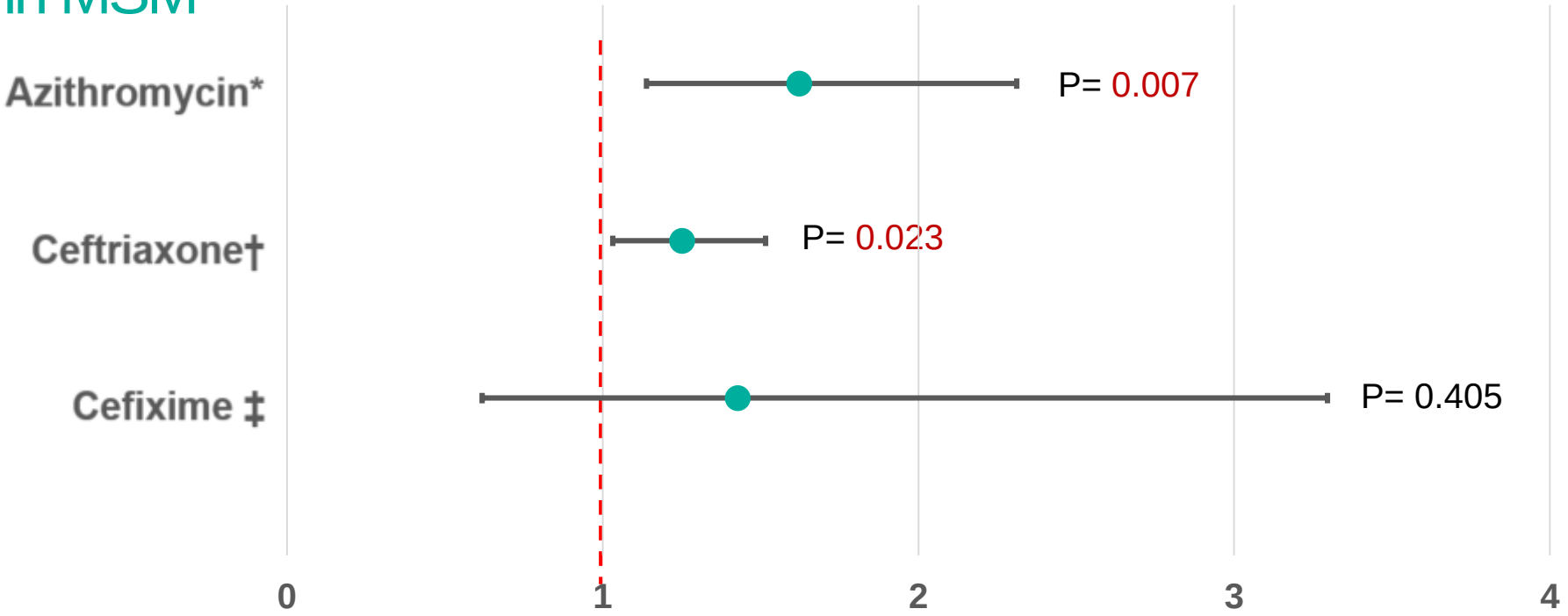
Bivariate results: Odds of AMR by site of infection in three antimicrobials

MSM:

Heterosexuals:

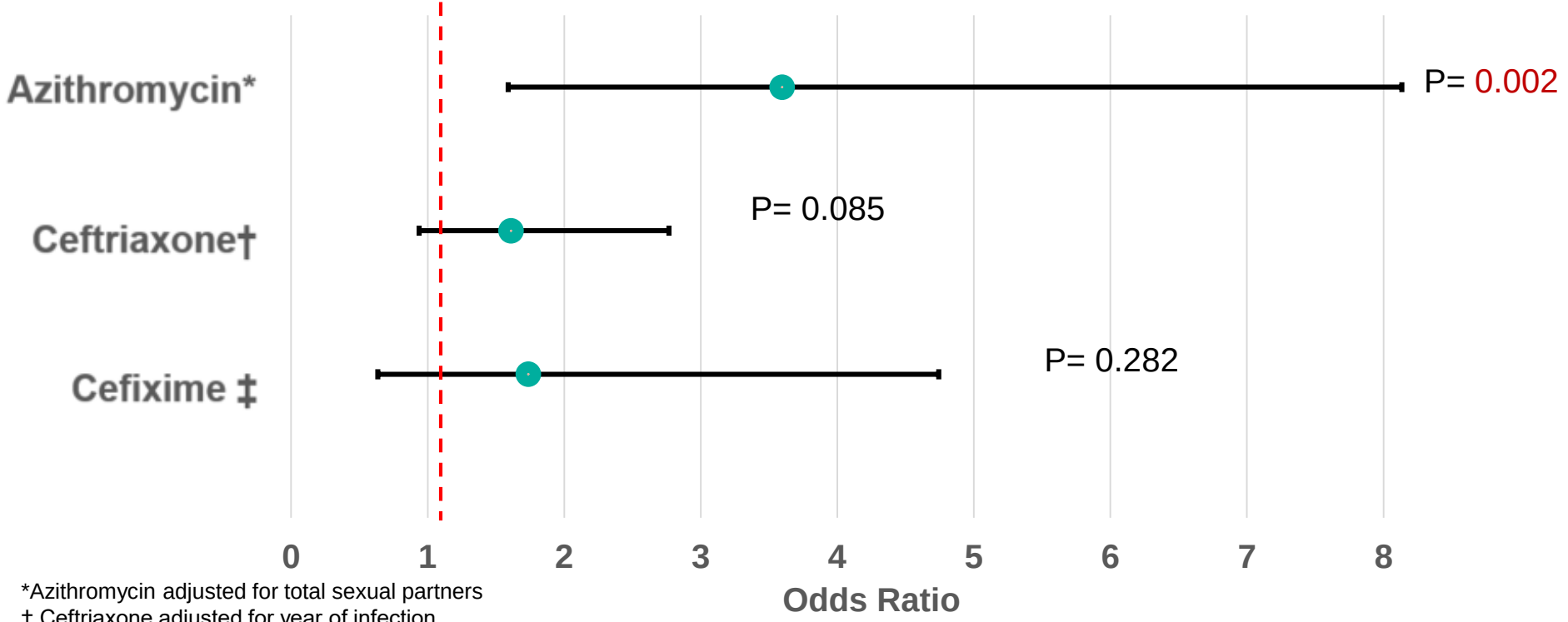
	Sample site	Odds Ratio	(95% CI)	P value
Azithromycin	Urethra	1		
	Pharynx	1.82	(1.29, 2.58)	0.001
Cefixime	Urethra	1		
	Pharynx	1.12	(0.67, 1.84)	0.671
Ceftriaxone	Urethra	1		
	Pharynx	1.28	(1.07, 1.52)	0.006
Azithromycin	Urethra	1		
	Pharynx	3.78	(1.72, 8.30)	0.001
Cefixime	Urethra	1		
	Pharynx	1.40	(0.59, 3.30)	0.443
Ceftriaxone	Urethra	1		
	Pharynx	2.08	(1.29, 3.35)	0.003

Multivariable results: Association between AMR and site of infection in MSM



*Azithromycin adjusted for year of infection
† Ceftriaxone adjusted for year of infection
‡ Cefixime adjusted for previous gonorrhoea infection, presence of symptoms and HIV status

Multivariable results: Association between AMR and site of infection in heterosexuals



*Azithromycin adjusted for total sexual partners
† Ceftriaxone adjusted for year of infection
‡ Cefixime adjusted for previous gonorrhoea infection, presence of symptoms and HIV status

Limitations of the analysis

- As the GRASP programme only selects one sample per person we were not able to look at differences in MIC within individuals.

- The prioritisation of samples meant that isolates were retrieved from fewer pharyngeal samples compared to the other infection sites.

Conclusions and summary

- Pharyngeal infections were significantly associated with azithromycin resistance among both MSM and heterosexuals, compared to genital infections

- Pharyngeal infections were significantly associated reduced susceptibility to ceftriaxone among MSM and not in heterosexuals, compared to genital infections

- Our results show that in both MSM and heterosexual's, pharyngeal infections are more likely to harbour resistance to azithromycin and in MSM, reduced susceptibility to ceftriaxone, compared to genital infections.

These results highlight the importance of extra-genital tests, antimicrobial susceptibility testing, and test of cure, especially among MSM, to reduce treatment failure and onward transmission of resistant strains.

Acknowledgments

We gratefully acknowledge all clinics who report to GUMCAD and laboratories involved in the GRASP programme, as well as all involved in testing samples and preparing the samples.

Thank you!

Questions?