

Surveillance of antimicrobial resistance in *Neisseria gonorrhoeae* in Switzerland needs to improve: analysis of data from the Swiss Centre for Antibiotic Resistance, 2004 to 2020

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Background

- Sexually transmitted *Neisseria gonorrhoeae* has developed resistance to multiple antibiotic classes, leading to ineffective treatment.¹⁻³
- Countries should update their guidelines, based on antimicrobial susceptibility testing (AST) of cultured isolates
- In Switzerland, the current guidelines for the treatment of *N. gonorrhoeae* can be found at <https://ssi.guidelines.ch/guideline/2290>

Search Guidelines

←

Gonococcie (N.gonorrhoea) (F)

Important
Etiologie / Epidémiologie
Clinique
Diagnostic
Traitement

⇒ il est important de prendre en compte la résistance aux antibiotiques

Urethrite, gonorrhée vaginale, anale ou oropharyngée

- Ceftriaxone 500 mg i.m. (éventuellement à dissoudre en 4ml Lidocain 1%) et injecter i.m.

PLUS

- Azithromycine 1 g p.o. en dose unique

1 Unemo M, Shafer WM. Antimicrobial resistance in *Neisseria gonorrhoeae* in the 21st century: past, evolution, and future. *Clin Microbiol Rev.* 2014;27(3):587-613.

2 Tapsall JW, Ndowa F, Lewis DA, Unemo M. Meeting the public health challenge of multidrug- and extensively drug-resistant *Neisseria gonorrhoeae*. *Expert review of anti-infective therapy.* 2009;7(7):821-34.

3 Unemo M, Bradshaw CS, Hocking JS, de Vries HJC, Francis SC, Mabey D, et al. Sexually transmitted infections: challenges ahead. *The Lancet Infectious Diseases.* 2017;17(8):e235-e79.

Objectives

- To describe trends in antimicrobial resistance (AMR) of *N. gonorrhoeae* in Switzerland from 2004 to 2020.
- To discuss the evolution of the available minimum inhibitory concentration (MIC) values for the antibiotics used for gonococcal treatment from 2004 to 2020.
- To forecast the time until resistance to ceftriaxone exceeds 5%.

Methods

- From 2004 to 2020, we analysed data from
 - Swiss Centre for Antibiotic Resistance (anresis.ch)
 - Routine surveillance data from Federal Office of Public Health (FOPH)
- We described trends in proportions of gonorrhoea cases with AST results, proportions of AMR and MICs for ciprofloxacin, azithromycin, cefixime and ceftriaxone.
- A multi-step model forecasts the development of AMR over time, based on MIC data and information on treatment recommendations.

Results 1

- From 2004 to 2020, FOPH reported 26208 gonorrhoea cases and anresis reported 2611 patients with results of AST for *N. gonorrhoeae*.
- The proportion of reported cases for which any sample had AST increased from 7.9% in the period 2004-2007 to 10.9% from 2016-2020.



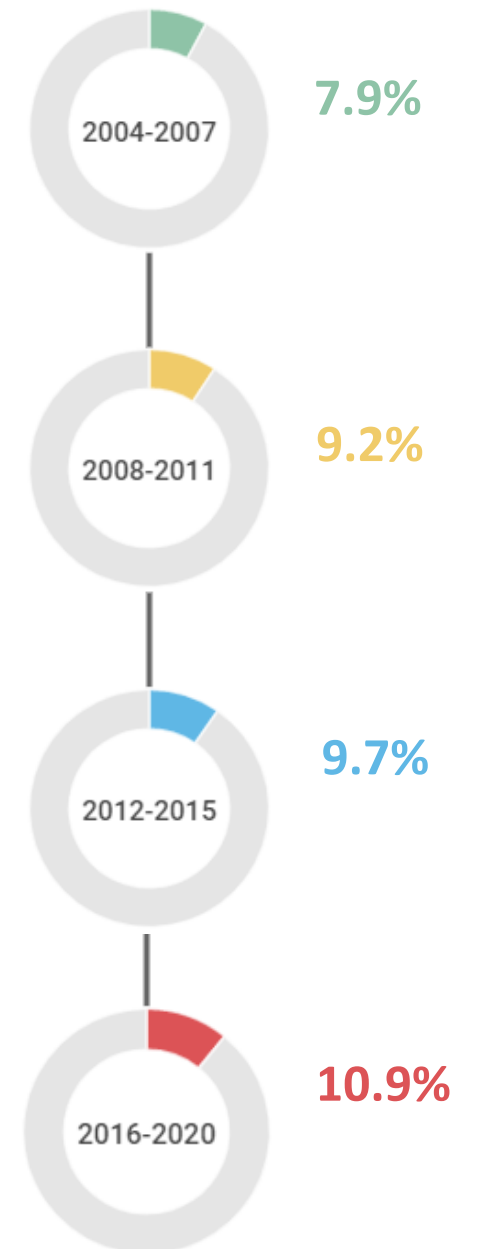
9.3%

Average proportion of gonococcal cases with AST



+ 10 labs

Increase in labs testing for AST from 2004 to 2020.



Results 2

By gender



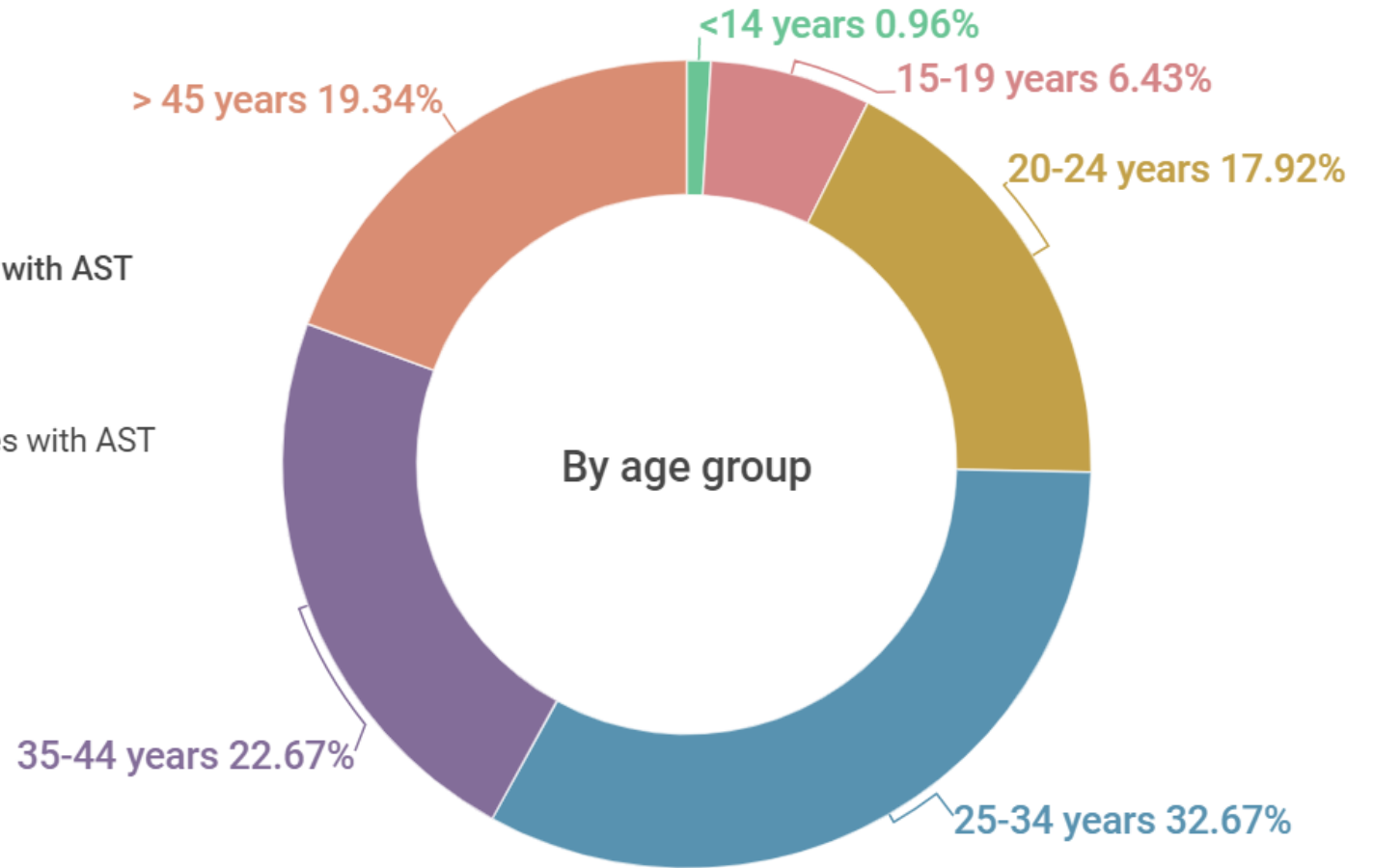
2027 (77.6%)

Number and proportion of male gonococcal cases with AST



582 (22.3%)

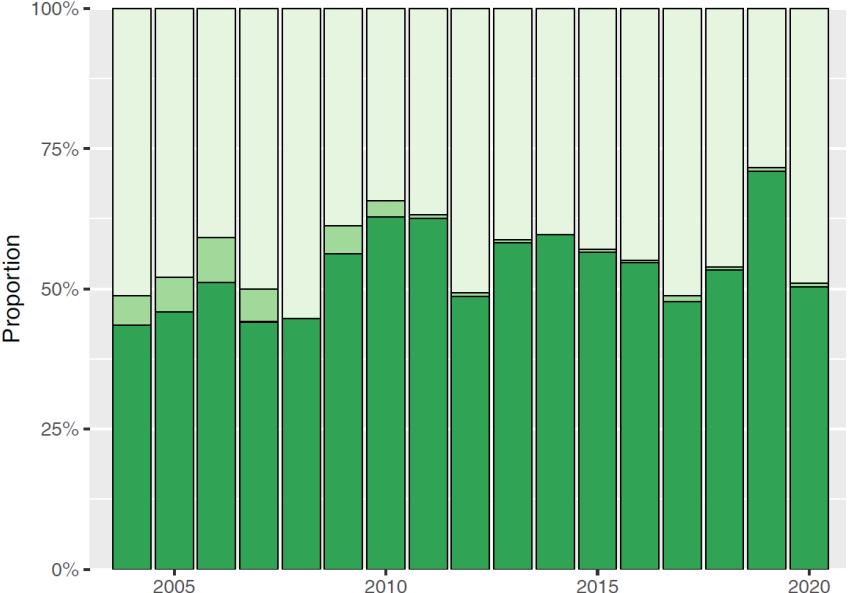
Number and proportion of female gonococcal cases with AST



Results 3

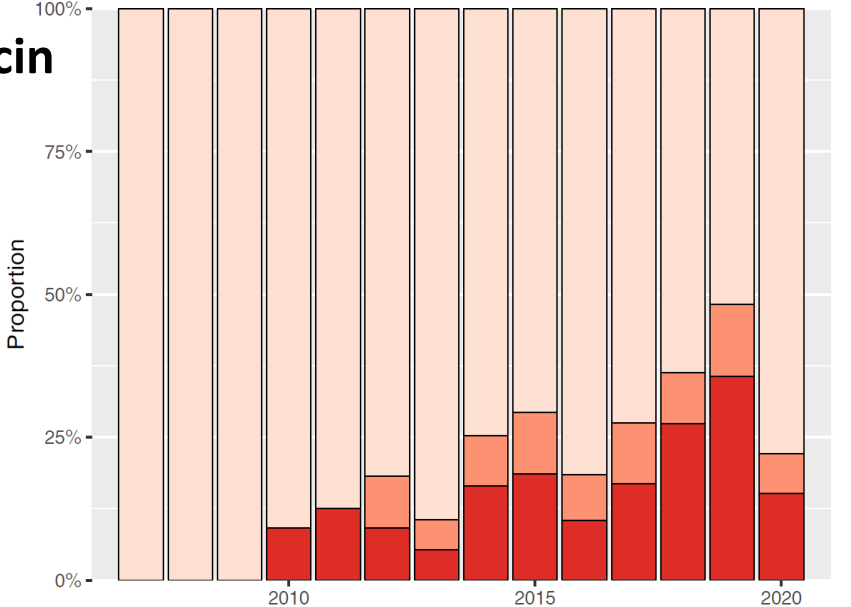
Ciprofloxacin

n = 2375



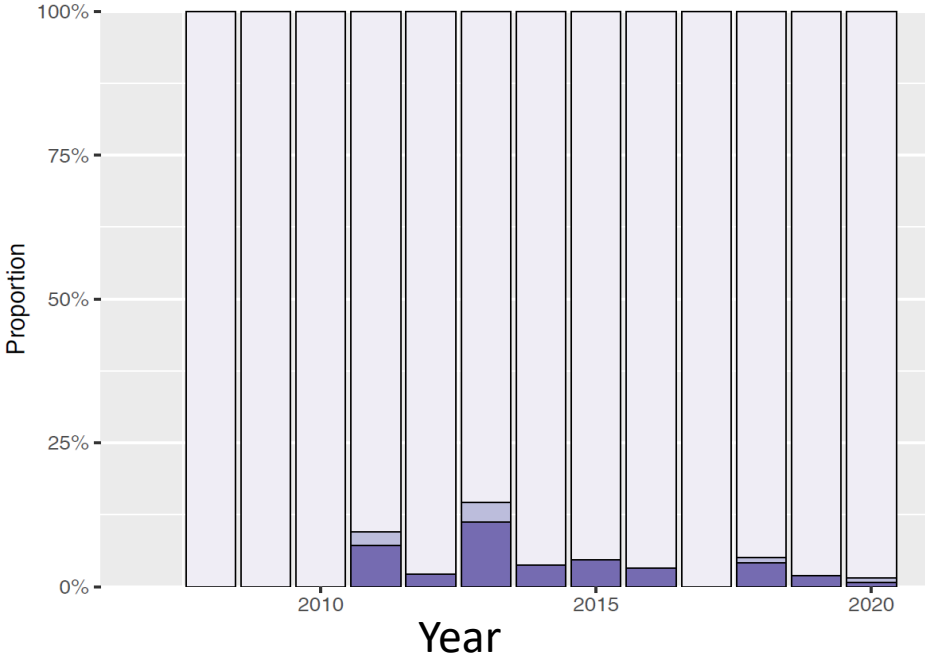
Azithromycin

n = 1105



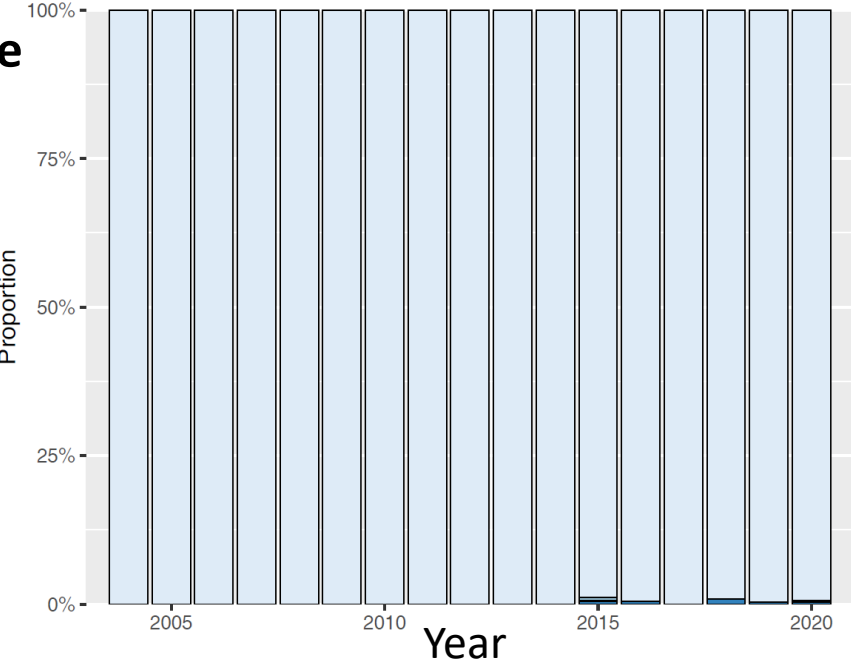
Cefixime

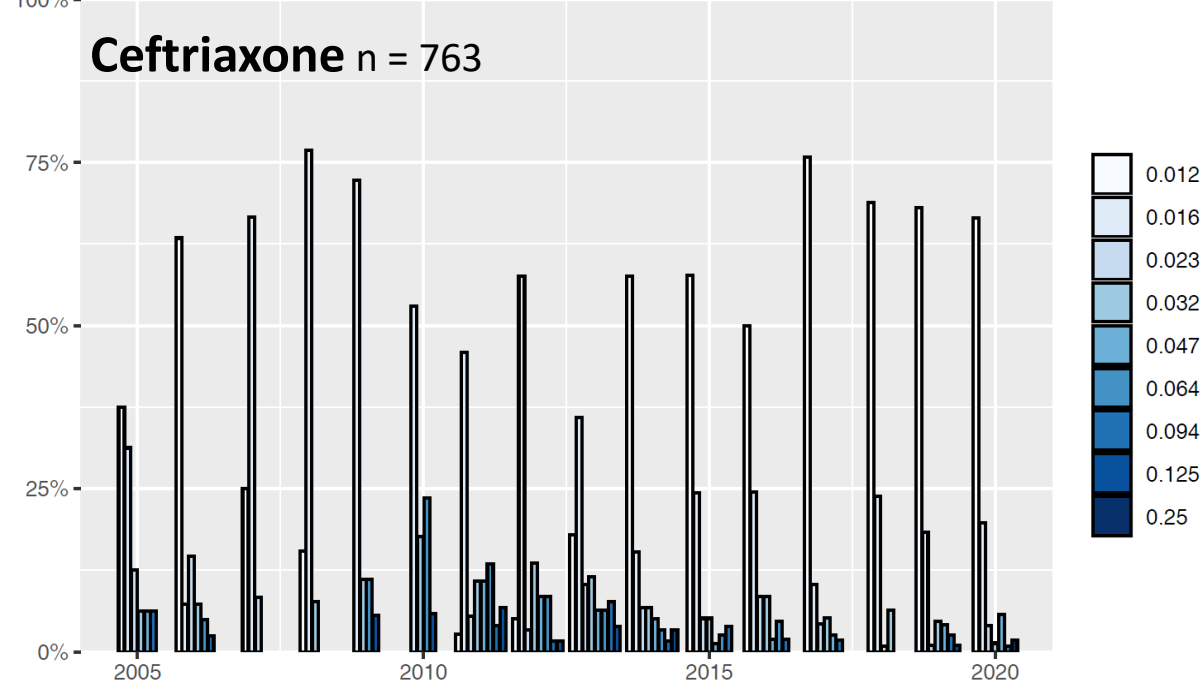
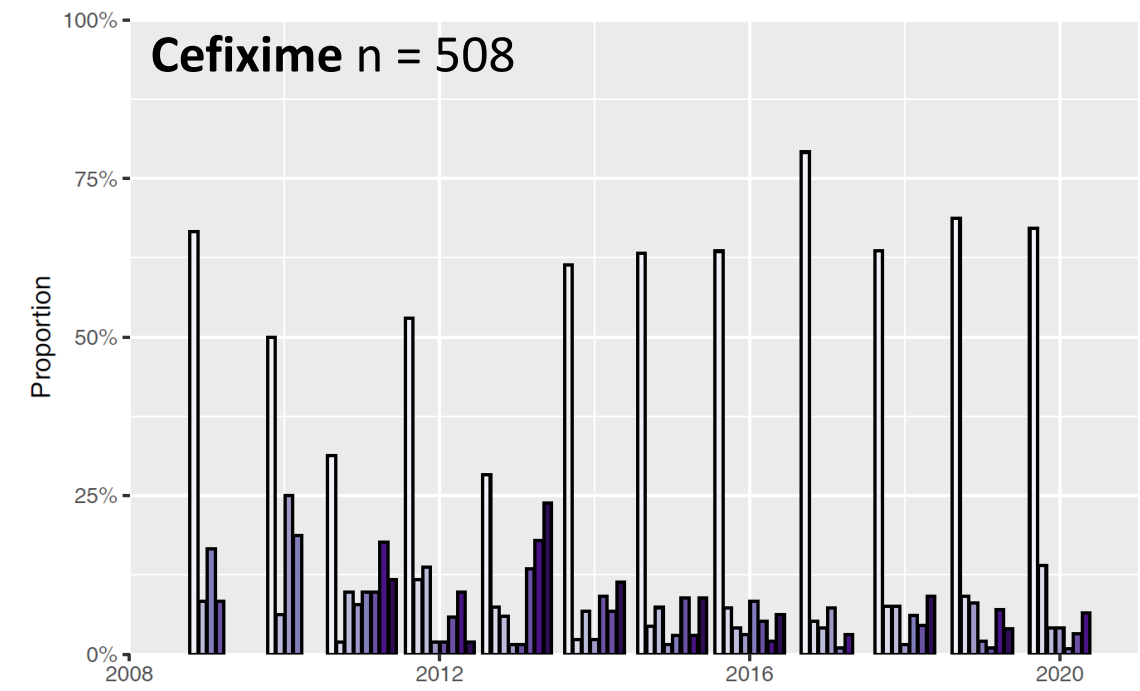
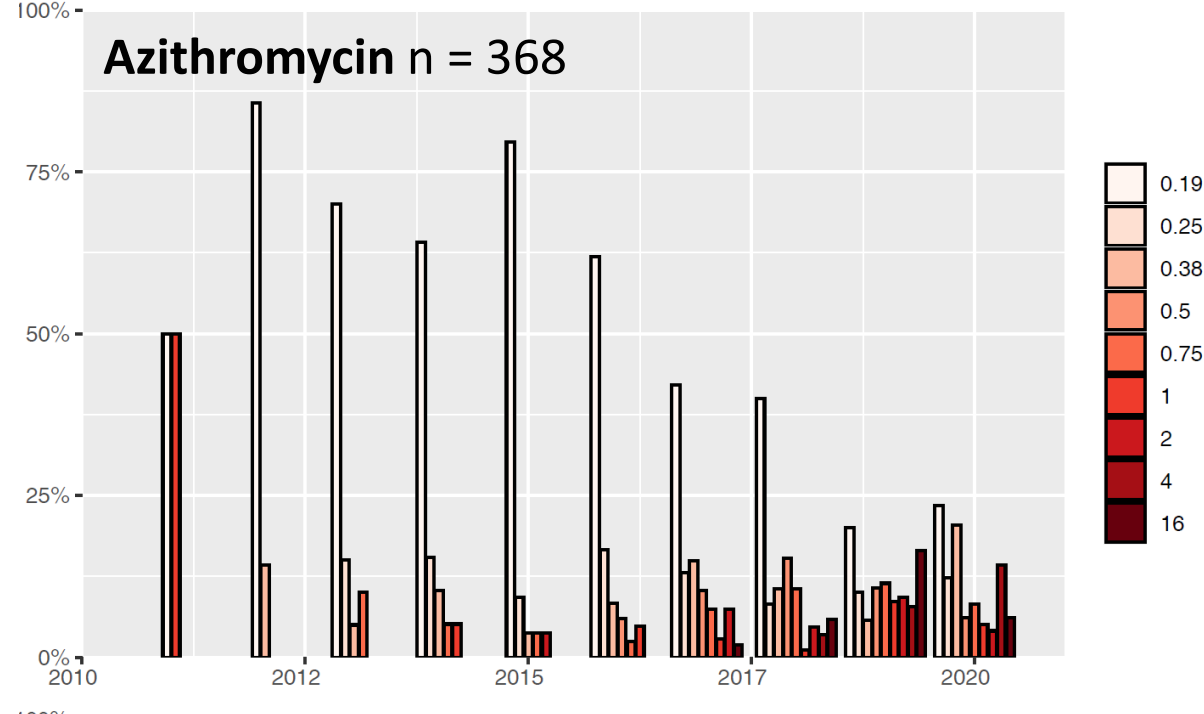
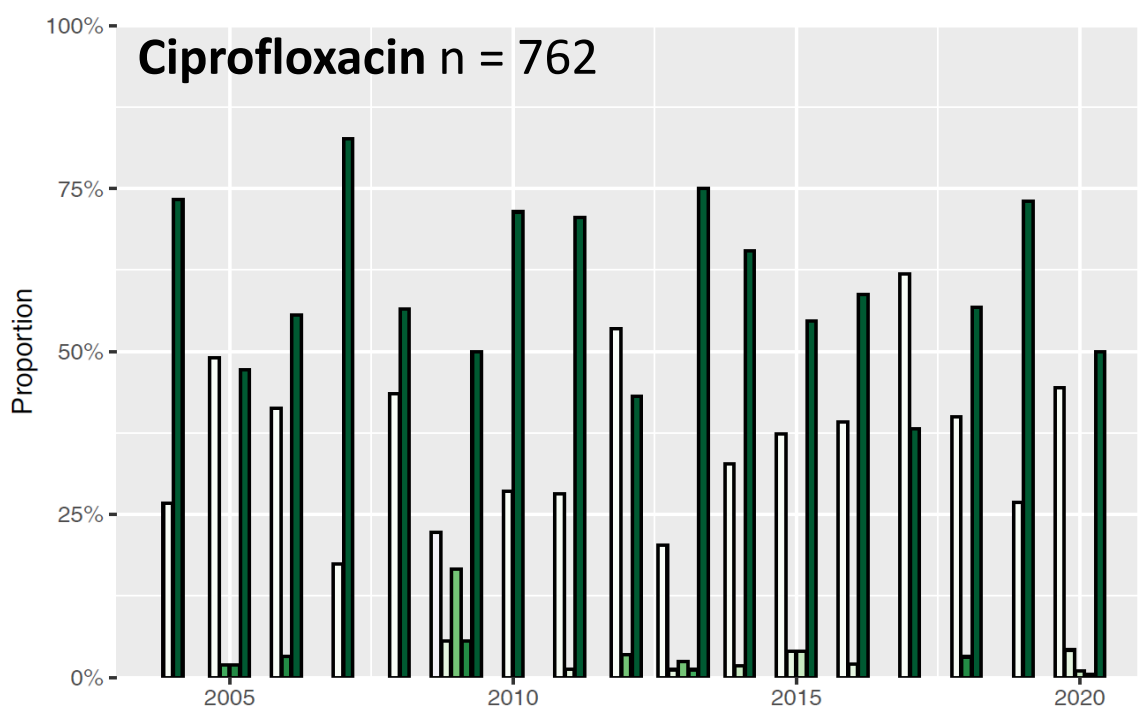
n = 1086



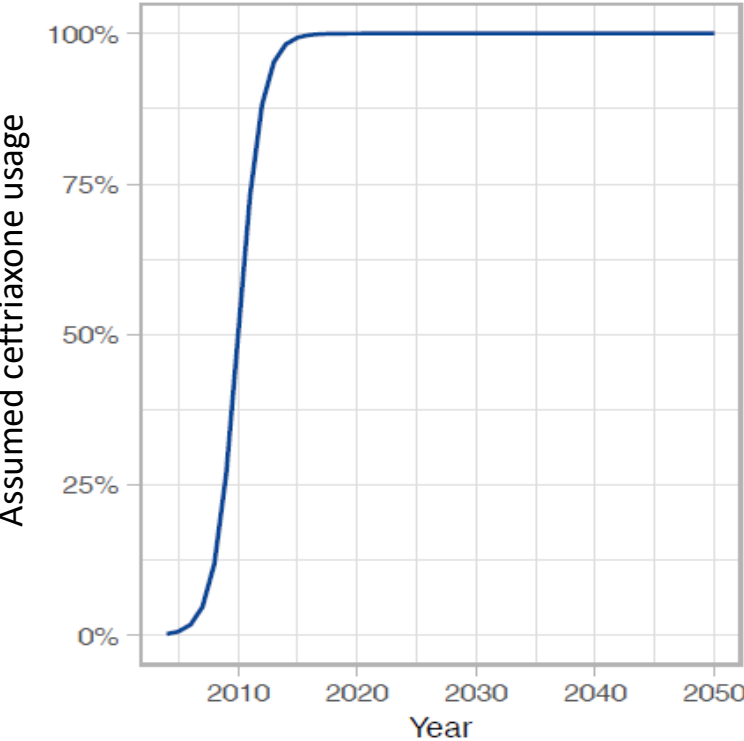
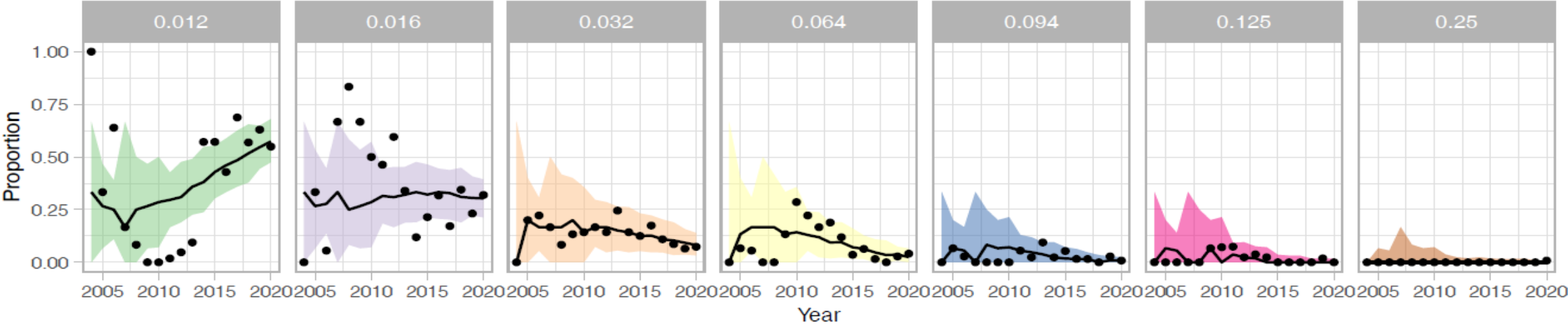
Ceftriaxone

n = 2497

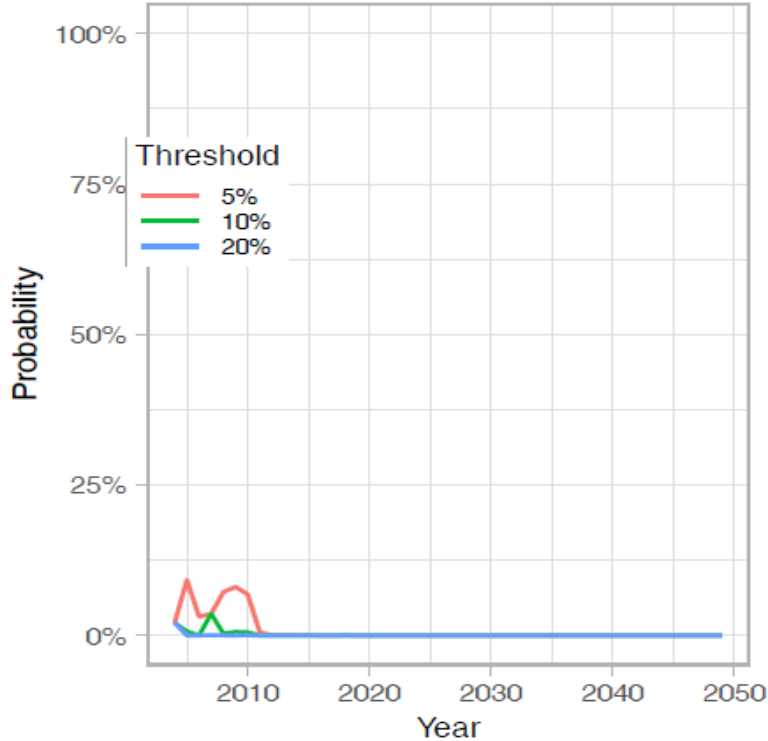




Results 5 – Multi-step model Ceftriaxone



- Increase in lower MIC values with treatment over time.
- We assumed that ceftriaxone was used since 2008, reaching 100% usage across Switzerland by 2010.
- The model forecasts that the probability of reaching the 5% resistance threshold will remain at zero until 2050.



Discussion

- Fivefold increase in AST data for *Neisseria gonorrhoeae* from 2004 to 2020 in Switzerland.
- However, the **sample size is small and inconsistent** across the years.
- There is likely to be a selection bias to the AST data collection and the proportion of resistant isolates maybe overestimated.
- Ceftriaxone along with azithromycin has been a part of the first-line regimen for gonococcal infections since 2008.
- MIC drift towards higher values can be interpreted as a progressive development of AMR and **reduced susceptibility to the antibiotic**.¹
- Ceftriaxone model demonstrates a MIC shift towards lower MIC values under pressure, contrary to studies from the UK. ¹
- **Influx of cases** outside Switzerland was not considered in the multi-step model.

¹ Chisholm SA, Mouton JW, Lewis DA, Nichols T, Ison CA, Livermore DM. Cephalosporin MIC creep among gonococci: time for a pharmacodynamic rethink? The Journal of antimicrobial chemotherapy. 2010;65(10):2141-8.

Conclusions

- Resistance to ceftriaxone remains **rare** in Switzerland.
- **Swiss surveillance data**, which could capture early AMR emergence and spread, are **weak**.
- Surveillance for AMR *N. gonorrhoeae* in anresis.ch should be improved, with **more samples sent for culture**.
- To monitor the drift towards samples with higher levels of resistance, **MIC values** should be reported for all samples
- In future, **whole genome sequencing** could provide additional information about the emergence of resistant clones.

THANK YOU

Please email your questions to

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We would happy to answer and discuss them with you!