

Background

Diagnosis of sexually transmitted infections globally and in Germany

According to the World Health Organization, >1 million new cases of sexually transmitted infections (STIs) are diagnosed globally each day.¹ Notably, most cases are diagnosed in the absence of symptoms during routine check-ups.¹ In Germany, annualized data on the number of new cases are not available for all STIs, nevertheless estimates published by the Robert Koch Institute suggest that the incidence of new infections has consistently risen in recent years for three of the most commonly reported bacterial STIs (Syphilis, Gonorrhea and Chlamydia).²⁻⁴ Nevertheless, costs associated with STI testing and associated care are only available for public reimbursement in cases where symptoms are present, or if a patient’s sexual partner has received a positive diagnosis.²

COVID-19 and the enactment of stay-at-home measures in 2020

In the months following the discovery of a new coronavirus in Wuhan, China (SARS-CoV-2) and the global spread of COVID-19 in early 2020, governments around the world instituted a wide range of measures aimed at containing further transmission and spread of the virus, which has since been attributed to over 6.5 million deaths worldwide⁵. In Germany, the first case of COVID-19 was detected in Bavaria on January 27, 2020,⁶ and the first lockdown measures (necessitating the closure of schools, borders, the containment of nursing homes, and subsequent lockdowns) were rolled out in mid-to-late March 2020⁷. Another partial, and later full, lockdown went into effect on November 2, 2020, and continued well into Quarter 2 of 2021.

Study objectives

In this study we sought to compare the number and profile of patients diagnosed with a few common bacterial STIs in the months leading up to and directly following the onset of the COVID-19 global pandemic. We hypothesized that COVID-19 mitigation measures may have negatively impacted the willingness of patients to attend routine wellness checkups and to seek care for undiagnosed symptoms, resulting in lower levels of diagnostic testing and, consequently, fewer STI diagnoses during periods in which pandemic-related lockdown measures were active in Germany.

Methods

Study Design

This study used German claims data provided by AOK PLUS from 01/01/2017-30/06/2021 to compare the number of new bacterial STI diagnoses (recorded quarterly) in the years preceding and directly following the enactment of COVID-19-related lockdown measures in 2020.

Data Source

The AOK PLUS database used in this study covers around 3.4 million people in the east German regions of Saxony and Thuringia and includes detailed information on sociodemographic characteristics of patients and all inpatient and outpatient diagnoses recorded for billing purposes, based on the International Classification of Diseases, 10th Revision, German Modification (ICD-10-GM) code book.

Patient Identification

Continuously insured adults with one inpatient and/or outpatient diagnosis of chlamydia (ICD-10 A55/A56), gonorrhea (A54), or syphilis (A51/A53) were included in this analysis. The number of new STI cases was assessed quarterly from 01/01/2018-30/06/2021. A window of 180 days was used to detect new cases, as re-infections are possible.

Study Outcomes

The number of new cases was reported quarterly, and sociodemographic characteristics of newly diagnosed patients were compared over time. Baseline characteristics including age, sex, and previous HIV/STI diagnoses were measured at index (date of corresponding STI diagnosis) and during the 12-month baseline period.

Limitations

The AOK PLUS dataset includes data on all inpatient/outpatient diagnoses and reimbursable care received by patients in Saxony and Thuringia. While care provided in these federal states is not expected to differ from that received elsewhere in Germany, the average age of patients is slightly higher than the national average. Furthermore, no information on out-of-pocket spending related to STI testing is recorded, meaning that it is difficult to assess if patients were diagnosed based on pre-existing symptoms, or via routine check-ups (at their own cost). Where possible, future research should assess the breakdown of cases according to symptomology at onset.

Disclosure & Acknowledgments

Rachel Knapp and Fraence Hardtstock are employees of Cytel Inc. and have no conflicts of interest to declare. Rafael Francisco Rios Chavarria is a former employee of Cytel Inc. who participated in this research as a member of the Cytel team. Thomas Wilke participated in this study as a member of IPAM e.V. and has received honoraria from several pharmaceutical/ consultancy companies, e.g., GSK, Bayer, AstraZeneca, NovoNordisk, Boehringer Ingelheim, AbbVie, and Roche. Ulf Maywald works for a statutory insurance fund (AOK PLUS), which provided the data used in this study.

Results

Patient Characteristics

Overall, 10,222 individuals (11,685 cases) were included in this analysis. Approximately 60.4% of included patients were female, with a mean/median age of 31.9/28.0 years. Only 3.1% of newly diagnosed individuals received a code for a bacterial STI during the 1-year baseline period. Chlamydia was the most common STI (77.2%), followed by gonorrhea (13.2%) and syphilis (9.6%). Females recorded more chlamydia cases (67.4%), while males accounted for a higher share of syphilis (76.9%) and gonorrhea (61.3%) cases. Chlamydia patients were younger at diagnosis (mean/median: 29.9/26.0 years) than gonorrhea (38.4/35.0) and syphilis (41.9/40.0) patients.

Table 1: Profile of German patients with newly diagnosed bacterial STIs from 2018-2021

Baseline characteristics	Chlamydia	Gonorrhea	Syphilis
New Cases – N (%)	9,025 (77.2%)	1,541 (13.2%)	1,119 (9.6%)
Patients – N (%)	8,171 (79.9%)	1,308 (12.8%)	743 (7.3%)
Age, at first STI diagnosis - Mean (SD)	29.9 (12.2)	38.4 (15.9)	41.9 (14.2)
Sex - % Female	67.2%	38.2%	25.0%
Patients diagnosed with HIV, during the 12-month baseline - N (%)	3 (0.0%)	0 (0.0%)	3 (0.0%)
Previously diagnosed with a bacterial STI, during the 12-month baseline - N (%)	216 (2.6%)	46 (2.6%)	56 (7.5%)

Diagnosis of bacterial STIs over time

Throughout the entire study period (including both pre-COVID and COVID periods), the quarterly number of new chlamydia and syphilis cases fluctuated heavily (Table 2). Moreover, a decrease in the number of new gonorrhea cases was observed in the quarters following the start of the COVID-19 pandemic. Notably, the number of new cases was lowest during periods in which lockdown measures were active in Germany (Q2 & Q4 in 2020, as well as Q1 in 2021). Nevertheless, we found no discernable difference in the number of new chlamydia and syphilis cases recorded during this time frame.

Profile of newly diagnosed patients over time

When comparing the sex-breakdown of cases logged in each quarter, the share of women with gonorrhea diagnoses was disproportionately lower during the COVID period, as compared to the pre-COVID window (median/range: 33.7%/27.4-38.1% vs. 42.6%/37.1-47.1% during pre-COVID). While no difference in age profile was observed for gonorrhea or syphilis, the age of patients diagnosed with chlamydia during COVID was noticeably lower than during the pre-COVID period.

Figure 1: Gender of patients with newly diagnosed STI cases over time

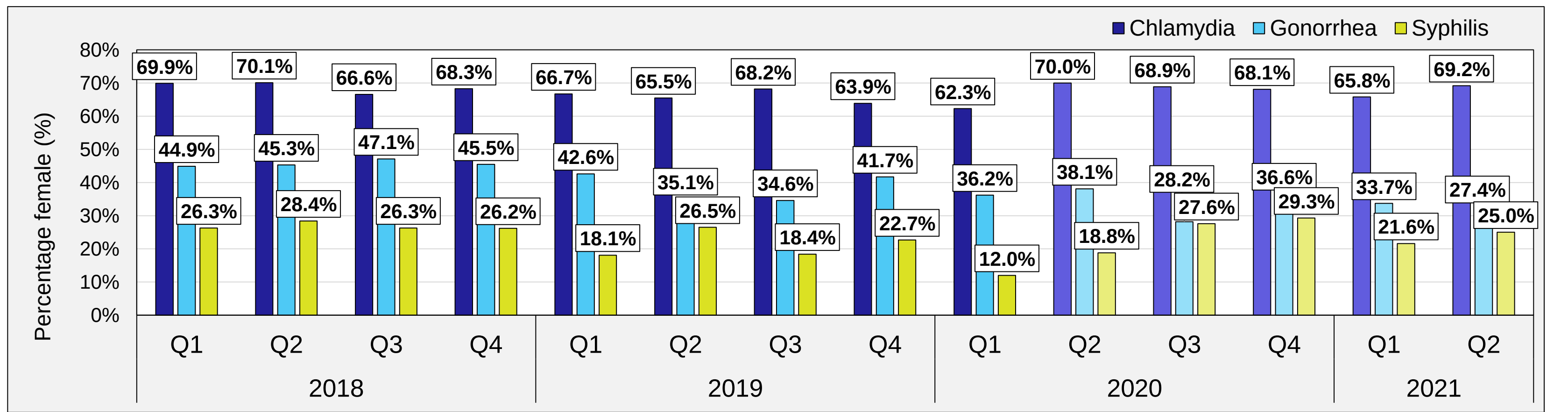


Table 3: Mean / median age of patients with newly diagnosed STI cases over time

	2018				2019				2020				2021	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Chlamydia	31.9 / 28	32.3 / 28	30.0 / 28	30.0 / 27	30.5 / 27	31.0 / 27	29.8 / 26	31.0 / 27	31.6 / 28	29.2 / 25	28.0 / 24	29.3 / 25	29.3 / 25	29.0 / 24
Gonorrhea	38.3 / 33.5	38.2 / 32	40.5 / 35	37.8 / 32	43.0 / 38	39.8 / 34	40.2 / 36	40.5 / 36	39.8 / 36	40.1 / 35.5	39.7 / 35	39.2 / 34	41.6 / 37	37.9 / 33
Syphilis	41.5 / 38.5	43 / 38.5	44.1 / 40.5	42.7 / 41	40.8 / 39	40.2 / 39	41.0 / 39	41.6 / 40	43.1 / 41	42.1 / 38.5	41.3 / 40	44.0 / 42	41.7 / 41	44.5 / 42.5

Conclusions

Fewer women received gonorrhea diagnoses during the COVID period, and the median age of chlamydia patients dropped visibly over the course of the pandemic. Further research is needed to better understand why differential trends were observed for different bacterial STIs and to assess whether these trends are suggestive of under-diagnosis or changes in risk-taking behavior during lockdown.

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