Evaluating Changes in the Diagnostic Setting and Treatment of Bacterial Sexually Transmitted Infections in Germany during COVID-19: A Descriptive Analysis of German Claims Data from 2018-2021

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Background

Each day, over one million new cases of sexually transmitted infections (STIs) are diagnosed around the globe, most commonly in the absence of symptoms.[1] While annualized incidence figures are not available for many bacterial STIs in Germany, according to the Robert Koch Institute, rates of syphilis and other bacterial STI cases have been rising nationwide over the past 20 years.[2] In Germany, STI testing is commonly performed in clinics during routine consultations by outpatient physicians including gynecologists, urologists and general practitioners (GPs). Notably, reimbursement for STI testing is only available for patients at high-risk (e.g., men who have sex with men) and those with active symptoms. [2] Consequently, asymptomatic patients are generally diagnosed at their own expense, and only receive reimbursement for subsequent care upon confirmation of a positive STI diagnosis.[2]

Following the World Health Organization's declaration of a Public Health Emergency on January 30, 2020, related to the international spread of COVID-19, governments worldwide were plunged into a state of fear, resulting in the closure of schools and borders, and the containment of nursing homes, as well as the enactment of various lockdowns and curfews.[3] On March 22, 2020, the first in a series of nationwide lockdowns was announced, resulting in the closure of schools, borders, bars, clubs, retail outlets, theaters, and sporting facilities until May 4, 2020[3]. Following a few months of leniency during summer 2020, another partial, and later full, lockdown was announced to the public on November 2, 2020, in response to concerns over rising COVID-19 cases and fears of a second wave in Europe. After months of social distancing and state-imposed curfews, the lockdown was lifted in Quarter 2 of 2021 and replaced by a range of vaccination-related containment efforts.

In order to assess potential changes in health seeking behavior during the COVID-19 global pandemic as well as the longer-term impacts of nationwide lockdowns, this study compared the diagnostic setting and treatment of new cases of chlamydia, gonorrhea and syphilis in Germany from 2018-2020.

Table 1: Timeline of COVID-19 related containment measures in Germany

COVID-19 Policy Timeline in Germany	
Jan. 27, 2020	First case in Germany
March 9, 2020	First death in Germany
March 13, 2020	Protection stage of RKI plan – school closures, postponement of academic semesters, prohibition of visits to nursing homes
March 15, 2020	Border closures (Austria, Denmark, France, Luxembourg, Switzerland)
April 15, 2020	Slight loosening of regulations
Nov. 2, 2020	Secondary Lockdown
Dec. 27, 2020	COVID-19 vaccinations began nationwide
Jan. 24, 2021	Stricter entry rules in effect
March 23, 2021	Radical Lockdown over Easter
April 23, 2021	Federal Emergency brake comes into force
May 14, 2021	Germany relaxes entry regulations

Methods

This study used German claims data provided by a statutory healthcare insurance fund, AOK PLUS, from 01/01/2017-30/06/2021 to compare the diagnostic setting and treatment of new cases of three common bacterial STIs (analyzed per quarter) in the years preceding and directly following the enactment of COVID-19-related lockdown measures in 2020.

The AOK PLUS database covers around 3.4 million people in the east German regions of Saxony and Thuringia and includes detailed information on the sociodemographic profile of patients, inpatient and outpatient diagnoses, based on the International Classification of Diseases, 10th Revision, German Modification (ICD-10-GM), as well as outpatient prescriptions recorded based on Anatomical Therapeutic Chemical (ATC) and corresponding German pharmaceutical registration (PZN) codes, recorded for billing purposes.

Continuously insured adults with one inpatient and/or outpatient diagnosis of chlamydia (A55/A56), gonorrhea (A54), or syphilis (A51/A53) from 01/01/2018-31/12/2020 were included in this analysis. New STI cases were recorded quarterly, and a window of 180 days was used to detect new cases, as re-infections are possible.

The distribution of new chlamydia, gonorrhea and syphilis cases according to diagnostic setting (e.g., inpatient vs. outpatient) was evaluated quarterly and compared over time. A six-month follow-up period was used to assess outpatient treatment of confirmed STI cases with prescribed therapies outlined in **Table 2** below.

Table 2: List of agents used to treat STIs

Treatments	ATC Codes
Chlamydia	
Doxycycline	A01AB22, J01AA02
Azithromycin	J01FA10
Levofloxacin	S01AE05, J01MA12
Gonorrhea	
Ceftriaxone	J01DD04
Azithromycin	J01FA10
Syphilis	
Benzathine Penicillin G	J01CE08, J01CE10
Doxycycline	J01AA02, A01AB22
Tetracycline	J01AA07
Benzylpenicillin	J01CE01

Results

Profile of newly diagnosed bacterial STI cases

In total, 8,913 individuals (cases: 10,032, female: 60.3%, mean age: 32.1 years) were identified. Among the detected new cases, most chlamydia (97.4%), gonorrhea (96.3%), and syphilis (96.9%) diagnoses were made in the outpatient setting. Among STI cases recorded in the outpatient setting (representing around 96.9% of all cases), the most common diagnosing physicians were gynecologists (54.5%), GPs (20.8%), and urologists (11.5%).

Setting of new STI diagnoses over time

From 2018-2020, the share of syphilis and gonorrhea cases diagnosed in inpatient vs. outpatient settings varied; no difference between pre-COVID and COVID periods was detected. Despite the overall low number of inpatient chlamydia diagnoses, the proportion of new cases reported in hospitals decreased after the pandemic onset (median/range: 1.8%/1.3-2.0% vs. 2.6%/2.1-3.9% during pre-COVID). No changes in relation to diagnosing physician were observed between pre-COVID and COVID-periods.

Treatment of STIs over time

Syphilis had the lowest treatment rate at 41.0% (penicillin: 27.9%, doxycycline: 13.1%, tetracycline: 0.0%), followed by gonorrhea with 54.9% (ceftriaxone: 16.2%, azithromycin: 39.6%), and chlamydia with 60.5% (doxycycline: 41.0%, azithromycin: 22.8%, levofloxacin: 1.1%). No longitudinal changes in relation to treatment were observed.

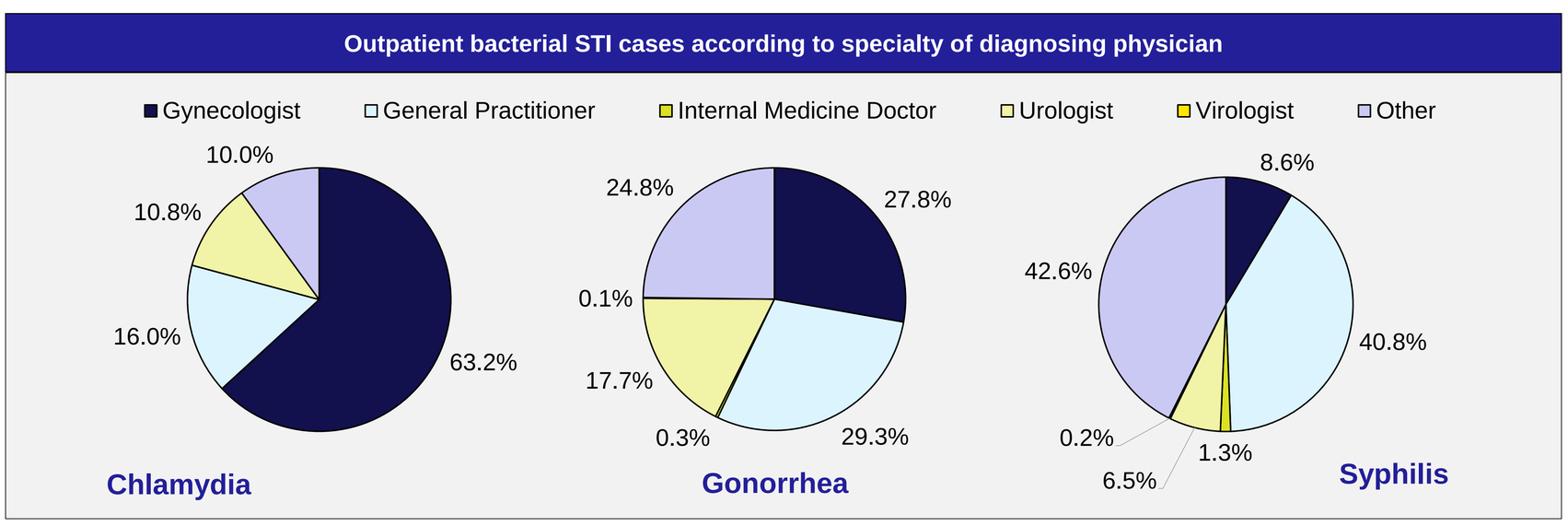
Table 3: New bacterial STI cases (N=X) per quarter from 2018-2020

		Chlamydia	Gonorrhea	Syphilis
2018	Q1	751	118	80
	Q2	632	137	74
	Q3	613	119	76
	Q4	621	101	65
2019	Q1	727	129	94
	Q2	583	111	68
	Q3	548	130	76
	Q4	571	115	97
2020	Q1	706	105	83
	Q2	670	84	80
	Q3	708	110	76
	Q4	599	93	82

Table 4: Share of new STI cases diagnosed in the outpatient setting (vs. inpatient setting), over time

		Chlamydia	Gonorrhea	Syphilis
2018	Q1	97.1%	97.5%	96.3%
	Q2	97.9%	94.9%	94.6%
	Q3	96.1%	100.0%	92.1%
	Q4	97.4%	96.0%	95.4%
2019	Q1	87.8%	94.6%	90.4%
	Q2	97.3%	96.4%	97.1%
	Q3	96.5%	96.9%	96.1%
	Q4	97.5%	94.8%	93.8%
2020	Q1	97.7%	98.1%	96.4%
	Q2	98.7%	97.6%	93.8%
	Q3	98.2%	98.2%	93.4%
	Q4	98.0%	96.8%	96.3%

Figure 1: New bacterial STI diagnoses by specialty of diagnosing physician



Conclusions

In Germany, the diagnosis of bacterial STIs is uncommon in the hospital. Within the outpatient care setting, diagnoses of bacterial STIs are most frequently recorded by gynecologists, GPs and urologists, among others. Ultimately the share of chlamydia cases diagnosed in the outpatient setting increased slightly during COVID, possibly in relation to healthcare resource capacity constraints. Due to the nosiness of data (and small sample sizes of quarterly gonorrhea and syphilis cases) no such trends were observable for the bacterial STIs. Further research is needed to explore potential reasons for differential impacts and to better understand low levels of observed follow-up treatment.

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.

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