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Original Research

Investigation of the prevalence of non-COVID-19 infectious diseases during the COVID-19 pandemic

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ABSTRACT

Objectives: This study aimed to investigate non-COVID-19-related upper respiratory tract infections (URTIs), gastrointestinal infections (GIIs) and urinary tract infections (UTIs) during the COVID-19 pandemic in Germany.
Study design: Cross-sectional study.
Methods: Patients with diagnoses of URTIs, GIIs and UTIs from 994 general practitioners (GP) and 192 paediatric practices that routinely send anonymous data to the Disease Analyzer database (IQVIA) were investigated. We studied the differences in recorded URTIs, GIIs and UTIs between April 2019–March 2020 (non-pandemic period) and April 2020–March 2021 (pandemic period) in terms of rates and baseline characteristics by comparing absolute frequencies.
Results: Compared with the non-pandemic period, the total number of patients with defined diagnoses was lower in the pandemic period (URTIs: 810,324 vs 520,800; GIIs: 253,029 vs 142,037; UTIs: 132,425 vs 117,932). The number of patients per practice with URTIs (683 vs 439, −36%, $P < 0.001$) and GIIs (213 vs 120, −44%, $P < 0.001$) decreased significantly during the pandemic period; the decrease in the number of recorded UTIs was smaller (112 vs 99, −11%, $P < 0.05$). The decrease in diagnoses was more pronounced among paediatricians than GPs (URTIs: −39% vs −35%; GIIs: −57% vs −39%; UTIs: −15% vs −9%). The decrease in URTIs varied between −35% and −40% depending on the age group.
Conclusions: Measures introduced during the COVID-19 pandemic to reduce transmission of the virus also helped to reduce the spread of non-COVID-19-related URTIs and GIIs. UTIs were impacted to a lesser extent, with rates seeing a slight decrease. An increase in awareness of infectious diseases may have also contributed to the reduction in recorded diagnoses.

Introduction

The implementation of strict worldwide measures to combat the spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has had a dramatic impact on individual behaviours and interactions between individuals. Measures, such as reducing indoor seating, social distancing, the wearing of masks and stay-at-home orders, helped to reduce SARS-CoV-2 infection rates.[1,2] In addition to these fundamental changes in social behaviours, the coronavirus disease 2019 (COVID-19) pandemic has also led to the general public having an increased awareness of the importance of hygiene and a better understanding of the transmission and spread of infectious diseases.

COVID-19 mitigation measures may have also influenced the occurrence of non-COVID-19-related infectious diseases. The spread of viruses and bacteria with similar transmission properties to those of SARS-CoV-2 and which also cause upper respiratory tract infections (URTIs) and/or gastrointestinal infections (GIIs) might be most significantly affected by anti-SARS-CoV-2 measures.[3–5] For other infectious diseases, such as urinary tract infections (UTIs), medical structural abnormalities (e.g. metabolic disorders) may be more relevant than measures intended to reduce social contact.[6] However, considering the general increase in awareness of infectious diseases and hygiene during the pandemic, it is reasonable to expect the rates for all non-COVID-19 infectious diseases to decrease (to varying extents).

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Thus, the present study aimed to investigate the change in reported non-COVID-19 URTIs, GIIs and UTIs between the non-pandemic period and the pandemic period using data from a large database, supplied with data from general practitioners (GPs) and paediatricians in Germany.

Methods

Database

This cross-sectional study was based on electronic medical record data from the Disease Analyzer database (IQVIA), which compiles drug prescriptions, diagnoses, and general medical and demographic data obtained directly (in an anonymous format) from computer systems used in GP practices and specialist departments.[7] Diagnoses, prescriptions and the quality of reported data are monitored by IQVIA based on an array of criteria. The coverage of this database is around 3% of all private practices in Germany. In Germany, the sampling methods used to select physicians' practices have been shown to be appropriate for obtaining a database of primary and specialised care that is representative of the German population.[7] The study was carried out in accordance with the latest version of the Declaration of Helsinki.

Study population

The analysis included patients who received at least one diagnosis of URTI (ICD-10: J01-J09, J20-J22), GII (ICD-10: A08, A09) or UTI (ICD-10: N39.0) between April 2019 and March 2021 in one of 994 GP or 192 paediatric practices that routinely send data to IQVIA. A total of 1,976,547 individuals were studied.

Study outcomes

The primary outcomes of this study were the number of URTIs, GIIs and UTIs documented by GPs and paediatricians between April 2019 and March 2020 (the non-pandemic period) compared with the number recorded between April 2020 and March 2021 (the pandemic period).

Statistical analyses

To assess changes in the number of reported infectious diseases, we compared the results for April 2020–March 2021 with April 2019–March 2020 and calculated the percentage change between both periods. To demonstrate practitioners' perceived changes, we also used the mean number of documented infection diagnoses per practice. A one-sample Kolmogorov–Smirnov test was used to check whether the data (patient number per practice) were distributed normally. As there was evidence that the data were not normally distributed, the number of patients with diagnoses per practice was compared for the two time periods using a non-parametric Wilcoxon signed-rank test. This test was also used to compare the average ages of patients diagnosed in the non-pandemic and pandemic periods. The proportions of women and men, patients in GP and paediatric practices, and age groups were compared using Chi-squared tests. Finally, we estimated a Pearson correlation coefficient to measure the strength of a linear association between COVID-19 and non-COVID-19-related URTIs. *P*-values of <0.05 were considered statistically significant. Analyses were carried out using SAS version 9.4 (Cary, NC: SAS Institute Inc).

Results

Patient characteristics

Compared with the non-pandemic period, the total number of patients with defined diagnoses was lower in the pandemic period (URTIs: 810,324 vs 520,800; GIIs: 253,029 vs 142,037; UTIs: 132,425 vs 117,932). Patient characteristics are presented in Table 1. The average age of individuals with infectious disease diagnoses was slightly higher in the pandemic period than in the non-pandemic period. In addition, the proportion of patients diagnosed by GPs increased slightly, especially for GIIs.

Infectious diseases documented in the non-pandemic period compared with the pandemic period

Table 2 shows the difference between the number of patients diagnosed with infections in the non-pandemic period and those diagnosed in the pandemic period. The number of patients per practice with URTIs (683 vs 439, −36%, $P < 0.001$) and GIIs (213 vs 120, −44%, $P < 0.001$) decreased significantly from April 2019–March 2020 to April 2020–March 2021; the decrease in the number of recorded UTIs was smaller (112 vs 99, −11%, $P < 0.05$).

The decrease in the number of URTIs diagnosed in GP and paediatric practices was similar (−35% and −39%). GII diagnoses decreased in paediatric practices much more than in GP practices (−57% vs −39%). The decrease in the number of patients with URTIs varied between −35% and −40% depending on age group, but no clear tendency could be identified. The greatest decrease in diagnoses of GIIs during the pandemic was seen in young children (−60% in the age group <6 years), and the decrease was least pronounced in the oldest age group (−19% in the age group >80 years). There was no significant change in the number of patients with UTIs in the age groups <6, 51–65, 66–80 and > 80 years.

Fig. 1 shows the monthly trends in COVID-19 and non-COVID-19-related URTI diagnoses (per practice) in GP and paediatric practices from April 2019 to March 2021. The Pearson correlation coefficient was 0.10 ($P = 0.172$) in GP practices and 0.08 ($P = 0.321$) in paediatric practices.

Discussion

In the current study, the largest decrease in non-COVID-19-related infections during the pandemic was detected for GIIs (−44%), followed by URTIs (−36%) and UTIs (−11%). For all three infectious diseases, the decrease was slightly more pronounced when diagnoses were made by paediatricians. Accordingly, during the pandemic period, diagnoses were less frequent among the younger age groups (6–17 years old). No specific trend for the change in diagnoses of infectious diseases was observed for gender. There was no significant correlation between diagnoses of COVID-19 and non-COVID-19 URTIs.

Many studies have reported that fewer diagnoses of various disorders were recorded during the pandemic period compared with previous time periods.[8–11] This could be interpreted as a general reduction in reporting during the pandemic, with patients being reluctant to seek medical help because of the risk of being infected with SARS-CoV-2 when visiting a physician.[8–11] Another possible reason that may influence the results of the current study could be the decrease in diagnoses observed in children (URTIs, GIIs and UTIs); children may recover more rapidly from infections than adults,[12] but both adolescents and their parents may avoid visits to paediatricians due to the risk of being infected with SARS-CoV-2. In contrast, for adults, no specific age-dependent trend could be identified for any of the three infectious diseases investigated.

Table 1
Sociodemographic characteristics of patients diagnosed with upper respiratory tract infections (URTIs), gastrointestinal infections (GIIs) and urinary tract infections (UTIs) in April 2019–March 2020 (non-COVID-19 pandemic period) and in April 2020–March 2021 (COVID-19 pandemic period)[a].

Sociodemographic characteristics	URTIs			GIIs			UTIs		
	April 2019–March 2020 (n = 810,324)	April 2020–March 2021 (n = 520,800)	*P*-value	April 2019–March 2020 (n = 253,029)	April 2020–March 2021 (n = 142,037)	*P*-value	April 2019–March 2020 (n = 132,425)	April 2020–March 2021 (n = 117,932)	*P*-value
Specialty									
GPs	70.2	71.5	<0.001	75.6	81.3	<0.001	70.4	71.8	<0.001
Paediatricians	29.8	28.5		24.4	18.7		29.6	28.2	
Age in years [mean (SD)]	30.5 (23.2)	30.8 (22.9)	<0.001	30.3 (21.7)	33.8 (22.2)	<0.001	40.9 (29.1)	42.6 (29.3)	<0.001
<6	18.9	17.6	<0.001	15.4	11.0	<0.001	16.6	15.8	<0.001
7–12	11.5	11.4		9.1	6.9		10.3	9.5	
13–17	7.2	7.4		8.0	7.5		5.9	5.6	
18–30	15.9	16.1		23.8	25.4		9.1	8.4	
31–50	23.5	25.8		24.2	25.2		15.4	15.1	
51–65	15.3	15.4		12.9	14.9		16.7	17.4	
66–80	5.3	4.9		4.1	5.4		15.8	16.4	
>80	2.4	2.4		2.6	3.7		10.2	11.7	
Gender									
Male	48.5	48.7	0.024	52.4	53.1	<0.001	29.3	28.7	0.003
Female	51.5	51.3		47.6	46.9		70.7	71.3	

SD, standard deviation.
[a] Data are percentages unless otherwise specified.

These combined reporting effects may partially explain the results of the current study.

On the other hand, the increased awareness of hygiene and the spread of infectious diseases during the pandemic may have resulted in behavioural changes in many individuals, also causing a decrease in the incidence of infections. In particular, specific measures targeting the spread of viruses or bacteria transmitted by aerosols and/or by oral transmission that were primarily intended to combat SARS-CoV-2 may have also influenced our findings regarding URTIs and GIIs diagnosed during the pandemic. The lower reduction of reported UTIs might also support this hypothesis. For UTIs, measures for reducing infectious disease transmission via aerosols may be less relevant as the occurrence of UTIs is facilitated by structural abnormalities as well as other hygiene deficits.[6,13]

Some authors have discussed the COVID-19 pandemic as a favourable opportunity for effective education in good hygiene practice, speculating that this could have a lasting impact on controlling the spread of infectious diseases.[14] In this context, it is necessary to mention the decline observed in influenza cases, in both adults and children, as the global seasonal spread for this disease is comparable to that of COVID-19.[15] Some reports even indicate the complete collapse of influenza epidemics during the 2020–2021 season.[16,17] This observation can be regarded as a welcome effect, since a dramatic drop in cases of seasonal influenza could preserve healthcare systems in critical phases of the pandemic, thus reserving resources for COVID-19 patients.

With regard to the decrease in incidence rates detected in our study, gender was not identified as a determinant factor. This was observed for all three infectious diseases investigated. Some pandemic reports described a more pronounced decline in vascular events (e.g. strokes and myocardial infarctions) in men compared with women, resulting in speculation about gender-specific differences in coping strategies with regard to these illnesses during the

Table 2
Total annual change in infection diagnoses (per practice) in GP and paediatric practices (April 2019–March 2020 [non-COVID-19 pandemic period] compared with April 2020–March 2021 [COVID-19 pandemic period]).

Characteristic	URTIs			GIIs			UTIs		
	April 2019–March 2020	April 2020–March 2021	change	April 2019–March 2020	April 2020–March 2021	change	April 2019–March 2020	April 2020–March 2021	change
	[n mean (SD)]	[n mean (SD)]	(%)	[n mean (SD)]	[n mean (SD)]	(%)	[n mean (SD)]	[n mean (SD)]	(%)
Total	683 (515)	439 (453)	−36***	213 (174)	120 (102)	−44***	112 (127)	99 (113)	−11[a]
Specialty									
GPs	572 (393)	375 (406)	−35***	192 (162)	116 (103)	−39***	94 (95)	85 (84)	-9[a]
Paediatricians	1259 (668)	774 (531)	−39***	322 (192)	138 (97)	−57***	204 (208)	173 (192)	−15[a]
Gender									
Male	331 (267)	214 (232)	−35***	112 (95)	64 (56)	−43***	33 (56)	29 (50)	−13[a]
Female	352 (253)	225 (224)	−36***	102 (81)	56 (47)	−45***	79 (77)	71 (69)	−10**
Age groups in years									
<6	129 (307)	77 (195)	−40***	33 (81)	13 (34)	−60***	19 (64)	16 (57)	−15
7–12	78 (165)	50 (115)	−36***	19 (43)	8 (20)	−57***	12 (36)	9 (31)	−17[a]
13–17	49 (58)	32 (45)	−34***	17 (20)	9 (12)	−47***	7 (15)	6 (15)	−16***
18–30	109 (107)	71 (90)	−35***	51 (59)	30 (38)	−40***	10 (13)	8 (11)	−17**
31–50	160 (142)	109 (131)	−32***	52 (54)	30 (33)	−42***	17 (22)	15 (19)	−13[a]
51–65	105 (87)	67 (83)	−36***	28 (26)	18 (18)	−35***	19 (25)	17 (22)	−7
66–80	36 (34)	22 (34)	−40***	9 (9)	6 (7)	−26***	18 (23)	16 (20)	−7
>80	17 (17)	11 (19)	−35***	6 (7)	5 (6)	−19***	12 (14)	12 (14)	1

GIIs, gastrointestinal infections; GP, general practitioner; SD, standard deviation; URTIs, upper respiratory tract infections; UTIs urinary tract infections.
[a] $p < 0.05$, $^{**}P < 0.01$, $^{***}P < 0.001$.

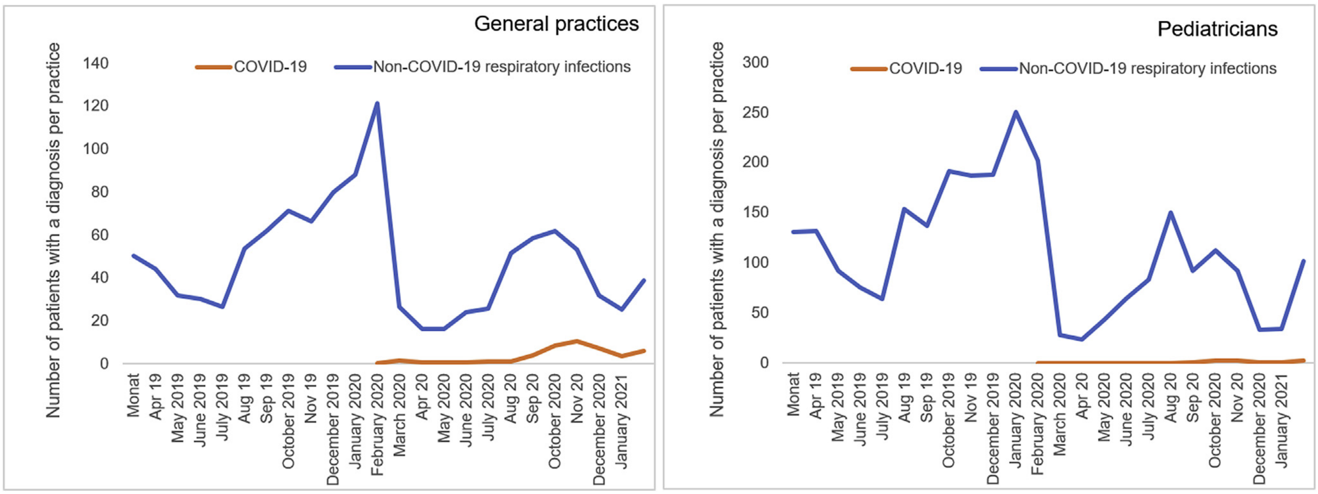

Fig. 1. Monthly trend in COVID-19 and non-COVID-19 upper respiratory tract infection diagnoses (per practice) in general and paediatric practices (April 2019–March 2021).

pandemic.[18–20] For infectious diseases such as those addressed in the present study, it appears that the pandemic environment influenced both genders similarly. However, while men may be more likely to avoid seeking medical care, our observations support the assumption that the decline in infectious disease rates depicted in our study might be determined by individual hygiene-related behavioural changes rather than a reluctance to book medical consultations.

Interestingly, a decrease in common respiratory viral infections during the COVID-19 pandemic has been reported in other countries. Parry et al. reported that in the United States, the difference in respiratory viral infections in April and May 2020 was significantly lower than during the same period in the previous 4 years. The authors attributed this result to the widespread use of public health interventions, including wearing face masks, social distancing, hand hygiene and stay-at-home orders.[21] Olsen et al. cited that influenza data reported to the World Health Organisation from Australia, Chile and South Africa showed very low influenza activity during June–August 2020. The authors assumed that the use of community mitigation measures for the COVID-19 pandemic, plus influenza vaccination, reduced the incidence of influenza during this time.[22]

The current study is subject to several limitations that need to be acknowledged. First, no information was available on any other potential reasons for the decrease in the number of medical consultations. Second, medical services may only have been able to accommodate a reduced number of non-COVID-19 consultations during the pandemic period. Third, URTI, GII and UTI diagnosis data relied solely on ICD-10 codes, and no data were available on the diagnosis process or the severity/activity of the disease. Fourth, no information was available on behavioural factors (e.g. alcohol use, smoking and sedentary lifestyle), and the role played by these factors, therefore, could not be examined. Fifth, no hospital data were available, and only outpatients were analysed.

The two major strengths of this study are the number of patients available for analysis and the detailed analyses using real-world data. The latter is particularly relevant, as the main medical point of contact for the diseases analysed in this study is the GP for adults and the outpatient paediatrician for children.

Conclusions

For all three infectious diseases investigated (URTIs, GIIs and UTIs), we detected a relevant decrease in incidence rates during the COVID-19 pandemic within the outpatient medical care sector, specifically GPs and outpatient paediatricians. The decrease in reported UTIs was less pronounced than that in GIIs and URTIs, supporting the hypothesis that pandemic mitigation measures to combat the spread of SARS-CoV-2 and increased hygiene awareness helped reduce the spread of these diseases.

Author statements

Ethical approval

German law allows the use of anonymous electronic medical records for research purposes under certain conditions. According to this legislation, it is not necessary to obtain informed consent from patients or approval from a medical ethics committee for this type of observational study that contains no directly identifiable data.

Because patients were only queried as aggregates and no protected health information was available for queries, no Institutional Review Board approval was required for the use of this database or the completion of this study.

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Competing interests

None declared.

Author contributions

CT and KK developed the idea for the study, and KK analysed the data. CT and KK wrote the manuscript. All authors contributed to and reviewed the final version of the manuscript.

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