Prof. Dr. rer. med. habil. Karel Kostev
Dr. rer. nat. Wolfgang Plendl
Dipl.-Biol. Sabine Kluge MS
Prof. Dr. med. Christian Tanislav

Increase in upper respiratory tract infections after the Covid-19 pandemic

The Covid-19 pandemic has posed major challenges to global healthcare systems (1). Even though the peak of the pandemic has passed and the longer-term consequences of SARS-CoV-2 infection, such as long Covid syndrome, now dominate the medical and scientific dialogue, non-Covid-related disease phenomena also pose a particular challenge. During the pandemic, a wide range of measures were taken worldwide to reduce the number of infections and minimise mortality (2, 3). In Germany, these measures included statutory contact and travel restrictions, the mandatory use of masks in large parts of public life and specific hygiene measures, which are often summarised as non-pharmaceutical interventions (NPI) (2). A large proportion of these NPIs were in force mainly in 2020 and 2021 and were gradually withdrawn during 2022. Although the benefits of most of these NPIs have been demonstrated in relation to possible SARS-CoV-2 infection (4, 5), their effects on the longitudinal course of other diseases not related to Covid-19 have hardly been systematically investigated to date.

>> Several studies have shown that as a result of the NPIs introduced to cope with the Covid-19 pandemic, there was a lower incidence of previously common influenza and streptococcal pneumonia (6, 7). This association between NPIs and the incidence of infectious diseases has also been observed in paediatric patients, e.g. viral respiratory infections (8, 9) or otitis media (10). Interestingly, there are currently several reports of an increased incidence of common infectious diseases following the successive discontinuation of NPI after the end of the pandemic (11). This correlates with a high level of sick leave, which in turn poses major socio-economic challenges.

In the present manuscript, we used a large German Electronic Medical Records (EMR) database to investigate the prevalence of Upper Respiratory Tract Infections (URTI) and the associated duration of sick leave before, during and after the peak of the Covid-19 pandemic in adult patients in Germany.

Methods

The cross-sectional study is based on electronic health data from the Disease Analyser database (IQVIA), which records drug prescriptions, diagnoses, and general medical and demographic data obtained directly and anonymously from computer systems in GP practices (12).

The present analysis included patients who were diagnosed at least once with an upper respiratory tract infection (ICD-10:J00-J06) in one of 947 GP practices between January 2019 and December 2022.

For the primary outcomes of this study, the number of patients per practice diagnosed with upper respiratory tract infections by GPs in 2019, 2020, 2021 and 2022 was recorded. The number of patients per practice in 2022 was compared with that in 2019. These analyses were performed separately for female and male patients and different age groups (18-30, 31-40, 41-50, 51-60, 61-70, 71-80 and >80). In addition, the number of patients with at least one day of sick leave and the average duration of sick leave per patient in days were compared and reported for each year between 2022 and 2019.

To assess changes in diagnoses, the percentage change between two periods (2022 versus 2019) was calculated. As the data were not normally distributed, the number of patients with diagnoses per practice, the number of patients with sick days per practice and the average duration of sick leave per patient for two different time periods were compared using the non-parametric Wilcoxon signed rank test. P-values <0.05 were considered statistically significant.

Results

A total of 2,269,607 patients visited one of the 947 GP practices in 2019 and 2,265,182 patients in 2022 (+/-0). In 2019, 439,546 patients were diagnosed with a URTI, in 2022 this number was higher with 693,629 diagnoses (+58%). The patient characteristics are shown in Table 1. The average age increased slightly from 39.4 years in 2019 to 41.1 years in 2022. The proportion of women was between 47% and 48%.

Figures 1 and 2 show the number of patients per GP practice with URTI from 2019 to 2022 by gender and age. The number of patients was significantly higher in 2022 than in 2019 (732 vs. 464, +58%, p<0.001); this significant difference was observed in both women (+56%, p<0.001) and men (+60%, p<0.001, Fig. 1).

The increase varied according to age. The largest increase was observed in the age group 18-30 years (+22%, p<0.001), followed by 31-40 years (+19%, p<0.001), 51-60 years (+18%) and 41-50 years (+16%). In the age group 61-70 years, the increase was +10% (p<0.001) and in older patients (>70) the increase was only +3% (Fig. 2).

Table 2 shows the results of the analyses of sick leave. The number of patients on sick leave due to a URTI increased strongly and significantly from 92 to 184 patients per practice. This trend was observed in women, men and the four age groups analysed. The increase in the average duration of sick leave was significant and averaged +2 days in 2021 compared to 2019.

Discussion

Our analysis of data from 947 GP practices in Germany showed

that URTI diagnoses decreased in the first year of the pandemic in parallel with the bans and stay-at-home orders, and that URTI diagnoses increased sharply after the withdrawal of most non-pharmaceutical interventions (NPIs) in 2022.

The most important finding of our analysis is the dramatic and sudden increase in URTI infections following the easing of Covid measures in 2022.

increase was observed in both men and women and in all age groups. At this stage, we can only hypothesise about the reason for this result. Firstly, there is the possibility that people have had too little contact with pathogens since the beginning of 2020 due to the Covid-19 measures and have not been able to train their immune system. This hypothesis has frequently appeared in the daily press but not in the scientific literature and is still considered unproven.

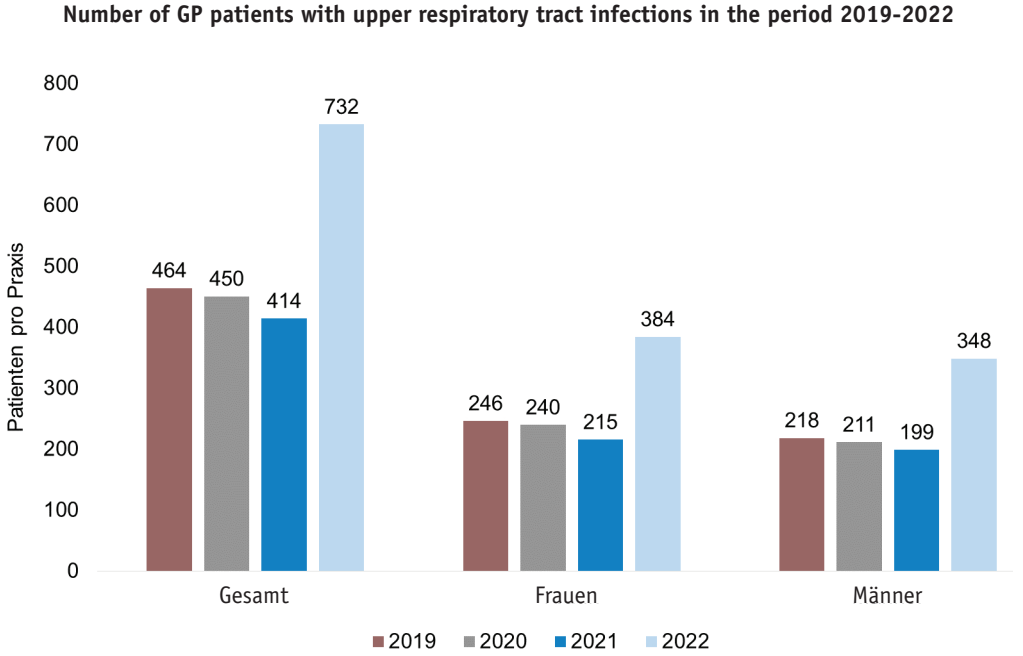


Fig. 1: Number of GP patients with upper respiratory tract infections in the period 2019-2022 (total and by gender).

In a simulation study from the USA, an increase in respiratory syncytial virus (RSV) epidemics was predicted for the period after Covid-19 (2021 and 2022), which could be more intense and occur in a wider age range than in the typical RSV seasons (13, 14).

The authors concluded that the reason for the severe RSV outbreak could be the lack of immunity from previous seasons, so that the current RSV patient numbers reflect a dependence of susceptibility to infection on immunity from previous exposures (13). Nevertheless, we cannot exclude the possibility that Covid-19 infection (or subsequent long-Covid infection) predisposes individuals to subsequent URTI. As our data do not allow us to exclude this association as a potential confounder, this represents a potential bias in our study.

In addition, our analysis showed that the average duration of sick leave due to URTI increased by about two days from 2019 to 2022. According to the Federal Institute for Occupational Safety and Health (BAuA), every single day of sick leave leads to an economic loss of 347 euros (in 2021). In view of the high number of patients with an infection and the longer duration of illness in 2021, the economy is at risk of significant and increasing financial damage from infections.

Our study was subject to a number of unavoidable limitations related to the study design and methods. As many upper respiratory tract infections are asymptomatic or do not result in a visit to the GP, the database may not include all cases. Misdiagnoses or incorrect diagnoses cannot be ruled out. Unfortunately, we did not have information on patients' socioeconomic status or lifestyle-related risk factors, which may be strong risk factors for the development of URTI. In addition, comorbidities, such as other inflammatory diseases, could also influence the development of URTI. Further studies with similar designs and databases from other countries are needed to draw definitive conclusions.

In summary, we show a significant increase in upper respiratory tract infections across all demographic subgroups in Germany from 2019 to 2022. This increase has a significant impact on various socioeconomic factors, including the frequency and duration of sick leave. These findings continue to have significant implications for current and future pandemic management in Germany. <<

Socio-demographic characteristics of patients				
Soziodemografische Merkmale	**2019**	**2020**	**2021**	**2022**
Anzahl	439.546	426.621	392.075	693.629
Alter, Mittelwert (Standardabweichung	39,4 (18,9)	40,4 (18,9)	39,7 (19,4)	41,1 (19,2)
<18 Jahre (%)	6,9	7,4	8,6	8,6
18–30 Jahre (%)	21,4	21,3	23,2	23,2
31–40 Jahre (%)	20,1	19,9	20,0	20,0
41–50 Jahre (%)	16,0	16,7	16,2	16,2
51–60 Jahre (%)	16,2	16,6	15,8	15,8
61–70 Jahre (%)	11,4	10,9	9,8	9,8
71–80 Jahre (%)	4,1	3,7	3,6	3,6
>80 Jahre (%)	4,0	3,5	3,0	3,0
Männer	53,0	53,2	52,0	52,0
Frauen	47,0	46,8	48,0	48,0

Tab. 1: Socio-demographic characteristics of patients diagnosed with upper respiratory tract infections in 2019, 2020, 2021 and 2022.

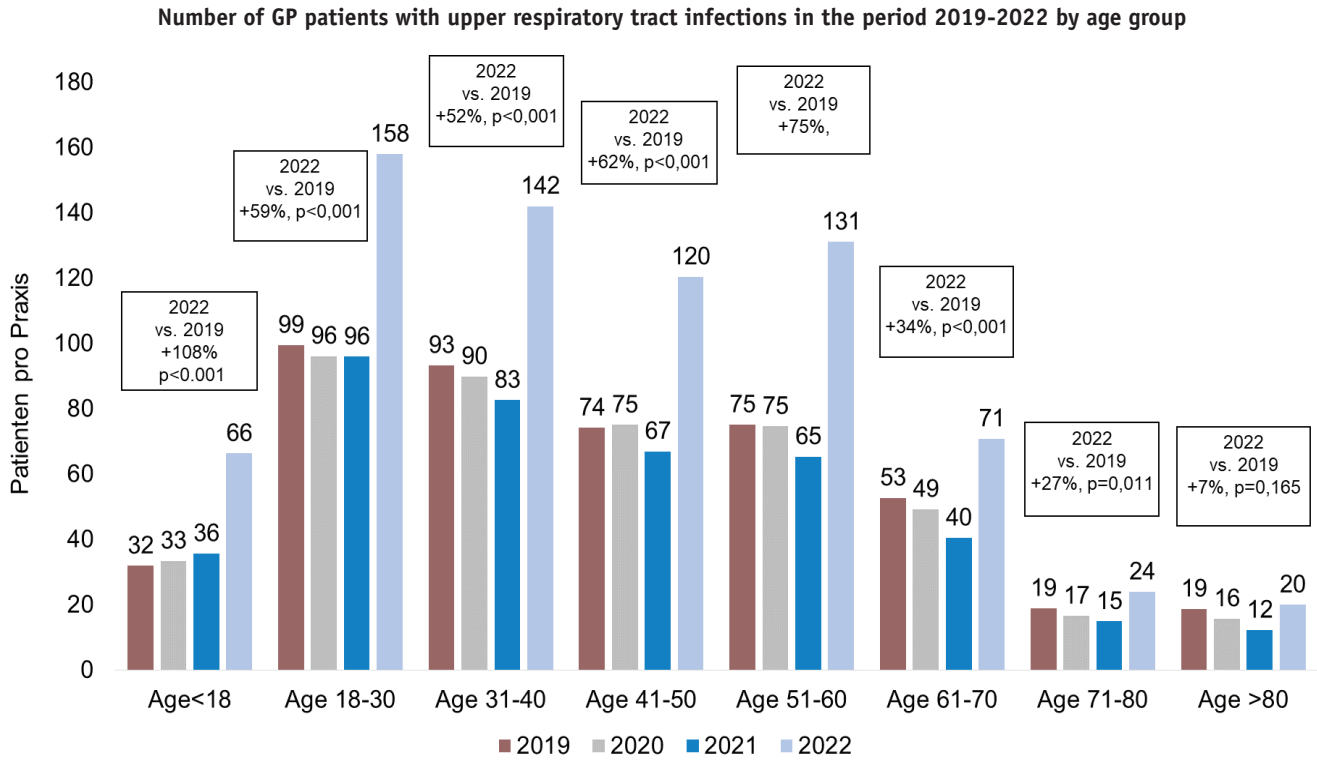


Fig. 2: Number of GP patients with upper respiratory tract infections in the period 2019-2022 by age group.

Length of sick leave in adult patients with upper respiratory tract infection					
Patientengruppe	**2019**	**2020**	**2021**	**2022**	**P-value (2019 vs. 2022)**
Anzahl der krankgeschriebenen Patienten pro Praxis					
Gesamt	92	104	101	184	<0.001
18–30 Jahre	26	29	32	53	<0.001
31–40 Jahre	27	29	27	47	<0.001
41–50 Jahre	20	23	21	39	<0.001
51–65 Jahre	19	22	19	42	<0.001
Männer	45	51	49	90	<0.001
Frauen	47	53	53	93	<0.001
Durchschnittliche Krankschreibungsdauer (Mittelwert, Standardabweichung)					
Gesamt	6.4 (5.6)	7.7 (6.8)	7.2 (6.7)	8.5 (7.0)	<0.001
18–30 Jahre	5.3 (4.1)	6.4 (4.9)	6.0 (4.7)	7.4 (5.4)	<0.001
31–40 Jahre	6.0 (4.4)	7.1 (5.2)	6.8 (5.1)	8.0 (5.5)	<0.001
41–50 Jahre	6.5 (4.7)	7.6 (5.5)	7.2 (5.5)	8.2 (5.6)	<0.001
51–65 Jahre	7.0 (4.9)	8.0 (5.8)	7.5 (5.6)	8.5 (5.6)	<0.001
Männer	6.2 (4.6)	7.3 (5.5)	6.8 (5.2)	8.1 (5.7)	<0.001
Frauen	6.2 (4.6)	7.3 (5.5)	6.8 (5.2)	8.1 (5.7)	<0.001

Tab. 2: Duration of sick leave in adult patients diagnosed with upper respiratory tract infection in 2019, 2020, 2021 and 2022.

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This cross-sectional study evaluated the number of patients with a diagnosis of upper respiratory tract infections (URTI) and with antibiotic prescriptions from the Disease Analyzer database (IQVIA) between January 2019 and December 2022. The number of patients with UTRI diagnoses and antibiotic prescriptions per practice and the duration of sick leave per patient were compared over time. A total of 1,403,907 patients from general practices (GP) were included, 48% of whom were female. The number of URTI patients per practice was significantly higher in 2022 than in 2019 (732 vs. 464, 58%, $p<0.001$) and this was observed for both women (56%, $p<0.001$) and men (60%, $p<0.001$). The post-pandemic increase in the number of URTI diagnoses correlated with age and was highest in the age group between 18–30 years (22%, $p<0.001$) and lowest in older patients >70 years (3%). Both the number of patients per practice on sick leave due to URTI (184 vs. 92) and the average duration of sick leave (+2 days) increased from 2019 to 2022. Our data suggest a dramatic increase in the incidence of URTI among all demographic subgroups in Germany between 2019 and 2022, which was associated with a tremendous impact on socioeconomic variables such as the frequency or duration of sick leave. These data could be of great importance in current pandemic management and the management of future pandemics.

Keywords

Upper respiratory tract infection, Covid-19, general practitioner, sick leave

Authors' declaration

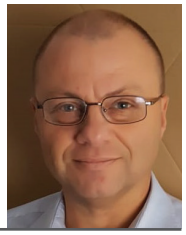
The authors declare that there are no conflicts of interest.

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Prof. Dr. rer. med. Karel Kostev ORCID: 0000-0002-2124-7227
is Senior Scientific Principal at IQVIA in Frankfurt. He studied sociology and statistics and holds a doctorate and habilitation in medicine. He teaches epidemiological and medical subjects at the University of Marburg. His work focuses on health services research in the field of chronic diseases

Contact: Karel.Kostev@iqvia.com



Dr. rer. nat. Wolfgang Plendl ORCID: 0009-0005-8861-1440
is a senior consultant at IQVIA Munich. He studied biology and received his doctorate in neurobiology at the Max Planck Institute of Psychiatry at the Ludwig Maximilian University in Munich. He has worked in the pharmaceutical industry, then in counselling. His work focuses on support and counselling at European level.
Contact: Wolfgang.Plendl@iqvia.com



Dipl.-Biol. Sabine Kluge MS ORCID: 0009-0009-6183-7457
is spokesperson for IQVIA in Frankfurt. She studied biology and science communication in Tübingen and Berlin and has worked in communications at universities and research organisations in the natural sciences, medicine and technology..
Contact: Sabine.Kluge@iqvia.com



Prof. Dr. med. Christian Tanislav ORCID: 0000-0002-2733-1294
is Head Physician for Geriatrics at the Diakonie Klinikum Jung Stilling Siegen and Adjunct Professor at Justus Liebig University Giessen. He studied human medicine in Giessen, where he completed his doctorate and habilitation.
Contact: Christian.Tanislav@diakonie-sw.de

