Follow-up of a national web-based survey on the SARS-CoV-2 infectious state of otorhinolaryngologists in Germany

Supplementary Information
The online version of this paper (https://doi.org/10.1007/s00106-021-01075-4) contains the German version of the COVID-19 questionnaire. The article and supplementary material are available at www.springermedizin.de. Please enter the title of the article in the search field. The additional material can be found at the article under “Ergänzende Inhalte”.

Background
More than 1 year after the appearance of COVID-19, the pandemic is still in full force. Healthcare workers (HCW) appear to be at higher risk of contracting SARS-CoV-2 [7]. Among these HCW, due to the very nature of the specialty, otorhinolaryngologists (ORLs) have a high probability of exposure to patient aerosols [2, 6, 8, 12, 13, 17, 24, 25]. Numerous recommendations for ORLs regarding the treatment of COVID-19 patients [1, 9–11, 19, 21, 22, 28] and protection against SARS-CoV-2 infection were published [4, 5, 14, 18, 20, 27, 31, 32]. However, only a few studies are available reporting the number of infections or estimating the risk of infection for ORLs [15, 23, 29, 30]. Recently, we reported that German ORLs had almost a 3.7-fold risk of contracting SARS-CoV-2 in the first wave of the pandemic compared with the population baseline level [15].

The aim of this study was to provide follow-up data on German ORLs from a continuous survey since the beginning of the pandemic in Germany in January 2020 to March 2021 in order to evaluate whether the relative risk for our specialty has changed over the course of the pandemic.

Methods
The study was designed as a follow-up of a previously conducted web-based survey of German ORLs, the methods of which were previously described in detail [15]. Briefly, the web-based survey was supported by the German Society of Oto-Rhino-Laryngology, Head and Neck Surgery (DGHNOKHC) and the German ENT Association (HNOBV). The members of the societies were addressed via e-mail (DGHNOKHC n = 3518; HNOBV n = 4179; in total N = 7697) and via the e-newsletters of the societies to participate. Reminders were launched bi-monthly on the Corona-News-Ticker of the societies (www.hno.org/de/corona) and individual reminders were also circulated among ORLs. The initial survey was active from April 17, 2020 to May 31, 2020 for all ORLs in Germany, regardless of SARS-CoV-2 status. It was intended to cover the beginning of the pandemic in Germany in January 2020 up to the decrease in the initial number of COVID-19 cases. The follow-up survey (June 1, 2020 to February 28, 2021 and still ongoing) aimed to register ORLs with a PCR-confirmed SARS-CoV-2 infection in the course of the pandemic. The questionnaire consisted of the same questions as the initial one. The survey was performed using SurveyMonkey (San Mateo, CA, USA).

Calculations and data interpretation were performed from the data used for the initial publication [15] as well as the follow-up survey. Some ORLs are members of both associations, which might result in an overestimation. Therefore, the total
Results

Course of infection and definition of two infection waves

On the basis of the daily number of infected persons, two infection waves can be identified. The cumulative number of infected individuals in Germany is given in Fig. 1a. In parallel, the cumulative increase in infected ORLs reveals two waves, as shown in Fig. 1b, and the course of COVID-19 in Germany is given in Fig. 1c. The first wave starts with the first registered SARS-CoV-2 infection on January 28, 2020. A peak was observed in March 2020 and the infection rate decreased to a baseline low level in May 2020. From August 1, 2020 an increase is detectable again, representing the beginning of the second wave. The peak occurred in December 2020 and the decrease plateaued at a new baseline in February 2021. February 28, 2021 was set as the end of the second wave when an increase was detectable again.

Demographic data

Overall, 129 ORLs (83 male, 46 female) reported a SARS-CoV-2 infection during the study period. During the first wave and second wave, 66 individuals (41 male, 25 female) and 63 ORLs (42 male, 21 fe-
Abstract

Purpose. The SARS-CoV-2 pandemic has affected the health and practice of otorhinolaryngologists (ORLs) for over 1 year. Follow-up data of a national survey with German ORLs were evaluated regarding differences between the two waves of the pandemic.

Methods. As in the initial survey, German ORLs were addressed via e-mail through the German Society of ORL, Head and Neck Surgery and the German ENT Association. All ORLs affected with SARS-CoV-2 were invited to participate in a web-based survey. General data on infections and concomitant parameters were evaluated.

Results. Since the start of the pandemic, 129 ORLs reported testing positive for SARS-CoV-2 in Germany. The ORLs infected during the first wave had a relative risk (RR) of 4.07 (95% CI: 3.20; 5.19) of contracting SARS-CoV-2. During the second wave, the RR decreased to 0.35 (95% CI: 0.28; 0.45). The availability of personal protective equipment (PPE) increased from the first to the second wave along with an increased perception of protection in the professional environment. The source of infection shifted from infections via medical staff during the first wave to patients and household exposure during the second wave. Regular medical practice was resumed by clinicians and general practitioners in the second wave. Nevertheless, a proportionally lower infection rate was observed compared with the German population as a whole.

Conclusion. The data reflect a unique long-term survey of ORLs during the pandemic. Differences in the source of infection were seen between the first and second wave, confirming the need for appropriate PPE for medical professionals working in high-risk environments. Further strategies to reduce the risk of infection include consistent testing for SARS-CoV-2 in healthcare professionals, patients, and the general public as well as vaccination of high-risk medical groups.

Keywords
ENT · ORL · Personal protective equipment · Risk · COVID-19

Ergebnisse der Web-basierten Nachfolgebefragung zum Infektionsstatus deutscher HNO-Ärzt*innen mit SARS-CoV-2

Zusammenfassung

Ziel. Die Pandemie mit SARS-CoV-2 bedroht seit nunmehr über einem Jahr die eigene Gesundheit und beeinflusst das alltägliche Arbeiten von HNO-Ärzt*innen in Deutschland. Die Nachfolgedaten einer initialen Web-basierten Befragung werden im Hinblick auf Unterschiede zwischen der ersten und zweiten Infektionswelle mit SARS-CoV-2 vorgestellt.

Methoden. Im Unterschied zur ersten Befragung (April bis Mai 2020), bei der alle HNO-Ärzt*innen – unabhängig vom Infektionsstatus – aufgerufen waren teilzunehmen, waren in der Nachfolgeerhebung (Juni 2020 bis Februar 2021) nur infizierte Kolleg*innen aufgerufen, daran teilzunehmen. Persönliche Daten zu Krankheitsverlauf, Symptomen, Arbeitsort, aber auch Informationen zu Infektionsursachen, Verfügbarkeit von Schutzmaterialien und empfundener Sicherheit wurden via E-Mail von der Deutschen Gesellschaft für Hals-Nasen-Heilkunde, Kopf- und Hals-Chirurgie (DGHNO KHC) und dem Deutschen Berufsverband der Hals-Nasen-Ohrenärzte e.V. (BVHNO) erfragt.

Ergebnisse. Seit Beginn der Pandemie infizierten sich 129 HNO-Ärzt*innen mit SARS-CoV-2. Das relative Risiko für HNO-Ärzt*innen lag während der ersten Welle bei 4,07 (95%-Konfidenzintervall, 95%-KI: 3,20; 5,19) und sank während der zweiten Welle auf 0,35 (95%-KI: 0,28; 0,45). Persönliche Schutzmaterialien waren während der zweiten Welle in ausreichendem Maß verfügbar, wohingegen viele Teilnehmer einen Mangeldar an der ersten Welle empfanden. Die gesicherten Infektionsketten zwischen erster und zweiter Welle wiesen Unterschiede auf. Während der ersten Welle spielte die Übertragung durch infiziertes Personal eine große Rolle. In der zweiten Welle lag der Schwerpunkt der Infektionsübertragung bei dem Kontakt zu COVID-19-Patient*innen und infizierten Familienmitgliedern. Die reguläre medizinische Tätigkeit wurde von Klinikärzt*innen und niedergelassenen Ärzt*innen in der zweiten Welle wieder aufgenommen. Dennoch zeigte sich eine anteilig geringere Infektion mit SARS-CoV-2 im Vergleich zur deutschen Gesamtbevölkerung.

Schlussfolgerungen. Die vorliegenden Daten der einzigen Langzeiterhebung unter HNO-Ärzt*innen während der Pandemie sprechen dafür, dass eine Rückkehr zu einer regulären HNO-ärztlichen Tätigkeit unter konsequenter Beachtung persönlicher Schutzmaßnahmen möglich ist. Zu den weiteren Strategien, um das Infektionsrisiko zu senken, gehören auch konsequentes Testen auf SARS-CoV-2 bei im Gesundheitswesen Tätigen, Patient*innen und der allgemeinen Bevölkerung sowie die frühzeitige Impfung für medizinische Hochrisikogruppen.

Schlüsselwörter
Hals-Nasen-Ohren-Heilkunde · Otorhinolaryngologie · Persönliche Schutzausrüstung · Risiko · COVID-19

males) were infected. The age distribution and practice location (hospital vs. private practice) are displayed in Table 1. Most of the infected ORLs working in hospital were between 30 and 40 years of age, whereas ORLs in private practice ranged between 50 and 60 years, with no difference between the two waves. During the first wave, the majority of infections in the general population of Germany occurred in the federal states of North Rhine-Westphalia, Baden-Württemberg, and Bavaria (Fig. 2). If the infected ORLs during the first and second wave as well as the total number are correlated with the total inhabitants of a specific federal state, the federal states of Bremen, Hamburg, Saxony-Anhalt, Saxony, and
Brandenburg are among the five most affected regions (Table 2).

**Clinical data**

The clinical symptoms of COVID-19 did not vary between the first and second wave (Table 3) and the duration of the disease and therapy required was also similar. In both waves, more than 90% of the infected ORLs were treated by domestic quarantine. Two ORLs needed to be admitted to an intensive care unit during the second wave. No fatalities were reported.

**Medical activities**

During the first wave, ORLs in hospital as well as private practice reduced their medical activities to a low level (Table 4). Clinical examinations were conducted by only approximately one quarter of the ORLs in hospital and private practice. Almost no surgeries—except a few tracheostomies—were conducted. An increase in clinical activity including endoscopy and surgeries was reported for the second wave both in hospitals and in private practice. The number of tracheostomies increased during the second wave.

**Personal protective equipment and perceived protection**

The availability of personal protective equipment (PPE) and perceived protection differed between hospital and private practice in the first wave but not in the second wave (Table 5). Private ORLs reported a low availability of PPE (and, as expected, a low perception of protection) during the first wave. Availability of PPE was higher in a hospital-based setting during the first wave than in private practice in both the first and second wave.

**Source of infection**

In comparison with those in private practice, during the first wave, ORLs in hospitals had more contact with infected medical staff, family, and the neighborhood and less contact with infected patients. Those in private practice had a higher percentage of unidentified contacts (Table 6). The ORLs in hospital assumed that their exposure was not related to their professional setting (patients + medical staff) whereas 52% of the confirmed sources of infection were within their professional environment from infected medical staff. No infection was traced back to infected patients in the first wave. During the second wave, contact with patients known to be positive increased for both hospital and private ORLs. The percentage of infected medical staff remained high in the hospital group (23%). Contact with a higher percentage of infected persons outside the hospital was reported. Perceived exposures were estimated in a more realistic manner compared with the first wave. Interestingly, private ORLs reported a higher percentage of confirmed infections by contact with infected medical staff during the second wave, whereas this percentage decreased for the hospital ORLs.

**Table 1 Age distribution of ORLs with SARS-CoV-2 infection**

| Age (years) | First wave Hospital (n = 25) | First wave Private (n = 41) | Second wave Hospital (n = 30) | Second wave Private (n = 33) |
|------------|----------------------------|---------------------------|-----------------------------|-----------------------------|
|            | Inhabitants | % 10–4 | Inhabitants | % 10–4 | Inhabitants | % 10–4 | Inhabitants | % 10–4 |
| < 30       | 1           | 0.9   | 1           | 0.9   | 4           | 0.36  | 4           | 0.36  |
| 30–35      | 12          | 1.14  | 10          | 0.76  | 25          | 1.9   | 25          | 1.9   |
| 36–40      | 7           | 0.79  | 5           | 1.98  | 7           | 2.78  | 7           | 2.78  |
| 41–45      | 1           | 1.09  | 4           | 1.09  | 8           | 2.18  | 8           | 2.18  |
| 46–50      | 1           | 1.47  | 2           | 2.94  | 3           | 4.4   | 3           | 4.4   |
| 51–55      | 2           | 2.71  | 1           | 0.54  | 6           | 3.25  | 6           | 3.25  |
| 56–60      | 1           | 0.16  | 4           | 0.64  | 5           | 0.8   | 5           | 0.8   |
| 61–65      | 0           | 0     | 0           | 0     | 0           | 0     | 0           | 0     |
| 66–70      | 0           | 0     | 0           | 0     | 0           | 0     | 0           | 0     |
| > 70       | 0           | 0     | 0           | 0     | 0           | 0     | 0           | 0     |

**Table 2 Geographical distribution and demographic correlation**

| Federal state | Inhabitants | First wave | Second wave | Total |
|---------------|-------------|------------|-------------|-------|
|               | % 10–4      | % 10–4     | % 10–4      |
| BW            | 11,103,394  | 10         | 4           | 1.26  |
| BY            | 13,124,737  | 15         | 10          | 1.9   |
| BB            | 2,251,893   | 2          | 0.79        | 2.78  |
| BE            | 3,669,491   | 4          | 1.09        | 2.18  |
| HB            | 681,202     | 1          | 1.47        | 4.4   |
| HH            | 1,847,253   | 5          | 2.71        | 3.25  |
| HE            | 6,288,080   | 1          | 0.16        | 0.8   |
| MV            | 1,608,138   | 0          | 0           | 0     |
| NI            | 7,993,608   | 4          | 0.5         | 1.13  |
| NW            | 17,947,221  | 12         | 0.67        | 1.77  |
| RP            | 4,093,903   | 3          | 0.73        | 1.47  |
| SL            | 986,887     | 0          | 1           | 1.01  |
| SN            | 4,071,971   | 0          | 10          | 2.46  |
| ST            | 2,194,782   | 4          | 1.82        | 3.65  |
| SH            | 2,903,773   | 5          | 1.72        | 1.72  |
| TH            | 2,133,378   | 0          | 1           | 0.47  |
| Germany       | 83,166,711  | 66         | 0.79        | 1.55  |

The abbreviations of the federal states are given in the legend of Fig. 2.

Fig. 2
Table 3  Symptoms, duration of infection, and therapy required for ORLs with COVID-19

| First wave | Second wave |
|------------|-------------|
| n          | %           | n  | %           |
| Symptoms   |             |    |             |
| No symptoms| 6           | 9.1| 5           | 7.6         |
| Fever      | 34          | 51.5| 27         | 40.9        |
| Cough      | 26          | 39.4| 23         | 34.8        |
| Coryza     | 13          | 19.7| 23         | 34.8        |
| Sore throat| 15          | 22.7| 14         | 21.2        |
| Musculoskeletal pain | 29 | 43.9| 34         | 51.5        |
| Fatigue    | 44          | 66.7| 41         | 62.1        |
| Dyspnea    | 4           | 6.1 | 12         | 18.2        |
| Hyposmia   | 26          | 39.4| 21         | 31.8        |
| Duration of disease (days) | | | |
| <12        | 32          | 48.5| 34         | 54.0        |
| 12–15      | 12          | 18.2| 16         | 25.4        |
| 16–20      | 9           | 13.6| 6          | 9.5         |
| 21–25      | 5           | 7.6 | 4          | 6.3         |
| 26–30      | 3           | 4.5 | 2          | 3.2         |
| >30        | 5           | 7.6 | 1          | 1.6         |
| Therapy    |             |    |             |
| Domestic quarantine | 64 | 97.0| 58         | 92.1        |
| Hospital regular care | 2 | 3.0 | 3          | 4.8         |
| Hospital intensive care unit | 0 | 0   | 2          | 3.2         |

*Hospital ORLs working in a hospital environment, Private ORLs working in a private practice*

Table 4  Medical procedures performed by ORLs during the first and second wave

| Medical procedures | First wave Hospital (n = 25) | Private (n = 41) | Second wave Hospital (n = 30) | Private (n = 33) |
|--------------------|-----------------------------|-----------------|-------------------------------|-----------------|
| Examination        | n (%)                       | n (%)           | n (%)                        | n (%)           |
| Nose               | 6 (24.0)                    | 10 (24.4)       | 20 (66.6)                    | 23 (69.7)       |
| Oral cavity        | 7 (28.0)                    | 10 (24.4)       | 22 (73.3)                    | 19 (57.6)       |
| Pharynx/larynx     | 7 (28.0)                    | 10 (24.4)       | 21 (70.0)                    | 19 (57.6)       |
| Ears               | 6 (24.0)                    | 10 (24.4)       | 17 (56.7)                    | 17 (51.5)       |
| Endoscopy          | 4 (16.0)                    | 10 (24.4)       | 19 (63.3)                    | 16 (48.5)       |
| Sonography         | 0 (0)                       | 8 (19.5)        | 8 (26.7)                     | 11 (33.3)       |
| Surgery            |                             |                 |                              |                 |
| Nose and sinus surgery | 0 (0) | 2 (4.9) | 2 (6.7) | 5 (15.2) |
| Tonsilllectomy     | 0 (0)                       | 0 (0)           | 2 (6.7)                      | 2 (6.1)         |
| Tumor surgery      | 1 (4.0)                     | 0 (0)           | 1 (3.3)                      | 0 (0)           |
| Ear surgery        | 0 (0)                       | 0 (0)           | 1 (3.3)                      | 0 (0)           |
| Tracheostomy       | 2 (8.0)                     | 0 (0)           | 9 (30.0)                     | 0 (0)           |

*Medical procedures Procedures which were performed by the participants, Hospital ORLs working in a hospital environment, Private ORLs working in a private practice*

Table 5  Availability of personal protective equipment and perceived protection of hospital ORLs versus those in private practice

| First wave Hospital (n = 25) | Private (n = 41) | Second wave Hospital (n = 30) | Private (n = 33) |
|-----------------------------|-----------------|-------------------------------|-----------------|
| n            | %              | n          | %              | n       | %              | n       | %              |
| Personal protective equipment |                 |             |                 |         |                 |         |                 |
| Surgical mask        | 25              | 100         | 37              | 90      | 30              | 100     | 32              | 97     |
| FFP2               | 18              | 72          | 18              | 44      | 29              | 97      | 28              | 85     |
| FFP3               | 8               | 32          | 5               | 12      | 7               | 23      | 5               | 15     |
| Protective glasses  | 16              | 64          | 15              | 37      | 22              | 73      | 24              | 73     |
| Helmet/shield       | 5               | 20          | 3               | 7       | 4               | 13      | 3               | 9      |
| PAPR               | 1               | 4           | 0               | 0       | 0               | 0       | 0               | 0      |
| Gloves             | 25              | 100         | 38              | 93      | 27              | 90      | 30              | 91     |
| Protective coat     | 22              | 88          | 13              | 32      | 25              | 83      | 23              | 70     |

| Perceived protection | | | | |
|----------------------| | | | |
| Mean                 | 2.52 | 3.49 | 2.17 | 2.61 |
| SD                   | 1.17 | 1.25 | 0.78 | 1.15 |
| 95% CI               | 2.06 | 2.98 | 3.93 | 3.07 |

*FFP2/3 KN 95 mask or equivalent, PAPR powered air-purifying respirator, SD standard deviation, 95% CI 95% confidence interval, Hospital ORLs working in a hospital environment, Private ORLs working in a private practice
*Perceived protection measured via Likert scale “Did you feel protected against an infection with SARS-CoV-2 during your professional activities?” Options of response: 1 = always; 2 = most of the time; 3 = sometimes; 4 = a little; 5 = never

Risk of infection for ORLs

The relative risk (RR; 95% confidence interval [95% CI]) of contagion during the first wave was 4.07 (95% CI: 3.20; 5.19) for all ORLs compared with the total population of Germany, with hospital-based ORLs having an RR of 6.32 (95% CI: 4.26; 9.38) and private ORLs an RR of 3.62 (95% CI: 2.66; 4.92). Contrary to the first wave, the RR for all ORLs decreased to 0.35 (95% CI: 0.28; 0.45) during the second wave, with an RR of 0.69 (95% CI: 0.48; 1.00) and 0.27 (95% CI: 0.19; 0.37) for hospital and private ORLs, respectively.

Discussion

The data presented here represent a unique long-term survey of ORLs in Germany since the beginning of the pandemic with SARS-CoV-2. Two clear waves were identified and the groups of ORLs with SARS-CoV-2 were compared. Differences in the availability of PPE, perceived protection, source of infection, and the relative risk of infection were detectable between the groups.

Several authors have provided registries of ORLs all over the world with respect to SARS-CoV-2 infection or COVID-19. The earliest data were published by Sowerby et al. in spring 2020 providing international data of 361 in-
second wave

| Table 6 | Assumed and confirmed source of SARS-CoV-2 infection for ORLs during first and second wave |
|---------|------------------------------------------------------------------------------------------|
|         | First wave                                                                                 | Second wave                                                                 |
|         | Hospital (n = 25)                                                                          | Hospital (n = 30) | Private (n = 41) | Private (n = 33) |
|         | n | % | n | % | n | % | N | % |
| Known contact with infected individuals | | | | | | | | |
| Patient | 8 | 32 | 13 | 32 | 20 | 67 | 20 | 61 |
| Staff   | 11 | 44 | 5 | 12 | 7 | 23 | 2 | 6 |
| Family  | 5 | 20 | 2 | 5 | 4 | 13 | 6 | 18 |
| Neighborhood | 4 | 16 | 1 | 2 | 2 | 7 | 1 | 3 |
| General public | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 3 |
| No contact | 4 | 16 | 21 | 51 | 2 | 7 | 11 | 33 |
| Assumption: “professional environment responsible for infection” |
| Yes | 1 | 4 | 10 | 24 | 8 | 27 | 10 | 30 |
| No | 11 | 44 | 4 | 10 | 11 | 37 | 7 | 21 |
| Unknown | 13 | 52 | 27 | 66 | 11 | 37 | 16 | 48 |
| Confirmed course of infection | | | | | | | | |
| Patient | 0 | 0 | 6 | 15 | 9 | 30 | 6 | 18 |
| Staff | 13 | 52 | 0 | 0 | 1 | 3 | 5 | 15 |
| Family | 2 | 8 | 2 | 5 | 5 | 17 | 4 | 12 |
| Neighborhood | 1 | 4 | 3 | 7 | 1 | 3 | 1 | 3 |
| General public | 0 | 0 | 0 | 0 | 3 | 10 | 1 | 3 |
| Unknown | 9 | 36 | 30 | 73 | 11 | 37 | 16 | 48 |

During the first wave, many hospital ORLs died from COVID-19 [29]. The weakness of that study lies in the data collection, which was performed by individual inquiry of the participating authors with only a minority of data derived from national surveys. The data presented here stem from a national survey of all contactable ORLs in Germany, with a response rate of 15.2% in a survey of all contactable ORLs in Germany during the first wave compared with other nations [26]. The authors describe the shortage of PPE as one of the reasons for the low adherence to PPE and our data confirm this speculation. The correlation between sufficient availability of PPE and high perceived level of safety is also reported for American ORLs [3, 32] and was confirmed in this survey again.

Due to the risk of infection, many ORLs reduced their regular surgical and ambulatory procedures [16]. Only one quarter of the participants in Germany continued performing regular examinations of the upper airways in hospital and private practice during the first wave. During the second wave, approximately two thirds of the ORLs in hospital and private practice performed regular examinations and surgeries. Adherence to PPE usage likely contributed to a reduction of infection in spite of increased potential exposure, as was recently demonstrated for pediatric ORLs [18].

No data are available about the risk of spread by healthcare professionals. During the first wave, many hospital ORLs had contact with COVID-19-positive medical staff. Once an infection was confirmed, healthcare professionals were sent into domestic quarantine but the low availability of PCR testing often led to a delay in confirmation. Moreover, rapid antigen testing was not commonly available during the first wave. Interestingly, the ORLs with COVID-19 did not consider medical staff factor to be a risk for their own infections in spite of coworkers being the source of more infections than COVID-19 patients in the first wave.
The relative risk (RR) for all ORLs during the first wave was 4.07. Our initial survey reported an RR of 3.67 [15]. The increase can be explained by additional ORLs who participated in the follow-up survey after termination of the initial survey. The reported RR is a minimum, as more participants in the survey would lead to an increase in the calculated RR. Other factors need to be considered that might have shifted the second wave RR toward the much lower value of 0.35. Reduced participation during the second wave is possible, but in order to reach a similar RR as the first wave, 657 ORLs would have been infected (10% of all ORLs in Germany).

**Limitations**

One limitation of this study is that data reflect only ORLs who were confirmed to be positive for SARS-CoV-2. Contrary to the initial survey in which 970 ORLs participated (15.2% of all ORLs in Germany), the follow-up survey collected information from infected individuals after termination of the first survey on May 31, 2020. When interpreting the given responses, it is important to keep in mind that the data are only derived from ORLs who tested positive for SARS-CoV-2 and might have a different opinion on concomitant parameters of the pandemic. On the other hand, the infected ORLs are part of a medical environment in hospitals and private practices. They work under the same conditions as non-infected colleagues and one can assume that most healthcare professionals have a similar perception of the medical environment they are working in.

**Practical conclusion**

- The survey provides data from the beginning of the SARS-CoV-2 pandemic to the present, which is unique for German otolaryngologists (ORLs) and not available for other medical specializations or countries.
- Despite an increase of individuals infected with SARS-CoV-2 in Germany during the second wave, ORLs were proportionally less affected than during the first wave. The source of infection shifted toward the private environment during the second wave.
- The consistent use of personal protective equipment (PPE) and more frequent testing appears to have lowered the risk of infection and enabled partial resumption of regular medical procedures despite an increase of infections in the total population.
- The strategy of consistent use of PPE in combination with testing and vaccination could support a return to regular medical practice for ORLs.

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**Declarations**

**Conflict of interest.** M. Herzog, A.G. Beule, J.-C. Luers, O. Guntinas-Lichius, L.J. Sowerby, V. Bogdanov and D. Grafmans declare that they have no competing interests.

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