



Protecting healthcare personnel and patients over 3 years of COVID-19

Effective protection by masks and hygiene: What else was effective?

Rolf Dörr

MVZ Praxisklinik Herz und Gefäße, Dresden, Germany

Abstract

Healthcare professionals, particularly those in test centers, laboratories, or specialized COVID-19 wards, are in danger of becoming infected. Patients with special underlying health conditions are at an increased risk of getting very sick, being hospitalized, or dying from COVID-19. Age is a leading risk factor in this context. Currently, FFP2 (Filtering Facepiece 2, European standard), N95 (US standard), and KN95 (Chinese standard) face masks remain the simplest measure of protection. Coronavirus warning apps installed on smartphones have been recommended for anonymous contact tracing and quickly disrupting chains of infection. Preventive testing two to three times per week for healthcare personnel, on the day of hospital admission for patients, and upon facility entry for visitors has been routinely performed or has been requested from external test centers in most medical institutions. However, vaccination is regarded the most effective protective measure against COVID-19. The general recommendation of the World Health Organization is that countries continue to work toward vaccinating at least 70% of their populations, prioritizing the vaccination of 100% of healthcare workers and 100% of the most vulnerable groups, including people who are over 60 years of age and those who are immunocompromised or have underlying health conditions. The most vulnerable individuals among patients and healthcare workers should be identified and then their vaccination status should be checked and, if necessary, optimized by booster administration. In Germany, seasonal and institutional recommendations for individual protection by face masks, for hygiene measures, and for preventive testing must follow the updated coronavirus protection regulations (*Coronavirus-Schutzverordnungen*).

Keywords

SARS-CoV-2 · Healthcare workers · Immunocompromised patient · N95 face masks · Vaccination

Epidemiological background

3 years after the first description of the new disease in Wuhan, China, at the end of December 2019, the World Health Organization (WHO) reported 756 million confirmed cases of COVID-19 worldwide, including 6.8 million deaths [1]. On 27 January 2020, the first case of COVID-19 in Germany was confirmed near Munich, Bavaria. And 3 years later, on 17 February 2023,

the COVID-19 pandemic had resulted in 38 million confirmed cases of COVID-19 and 167,214 deaths in Germany [1, 2]. Protective measures against COVID-19 have been shown to be of vital importance in reducing both morbidity and mortality. Our first recommendation in this regard, titled “Protecting patients and healthcare personnel from COVID-19: Considerations for practice and outpatient care in cardiology,” was published online in this journal on

Table 1 Conditions with increased risk for getting very sick, being hospitalized, or dying from COVID-19 (conditions are not in order of risk, and there is no claim to completeness)

1.	Older age, > 60 years
2.	Cancer, especially blood cancer (such as leukemia or lymphoma)
3.	Chronic lung disease
4.	Chronic heart disease
5.	Chronic kidney disease
6.	Chronic liver disease
7.	Dementia or neurological disability
8.	Diabetes mellitus type 1 or type 2
9.	HIV infection
10.	Immunocompromised conditions (steroid medication, biological therapy, chemotherapy, or radiation therapy)
11.	Mental health conditions (mood disorders including depression and schizophrenia)
12.	Overweight and obesity
13.	Pregnancy
14.	Sickle cell disease or thalassemia
15.	Smoking (current or former smoker)
16.	Solid organ or blood stem cell transplant
17.	Stroke or cerebrovascular disease
18.	Substance use disorders (such as alcohol, opioid, or cocaine)

16 April 2020 [3]. At that time, no coronavirus vaccination was available yet and the significant shortages in the supply chain for face masks, both for patients and for healthcare personnel, was a big problem in Germany and many other countries. An additional challenge was the appearance of new coronavirus omicron subvariants, which initially emerged in South Africa on 24 November 2021. These subvariants had a significantly higher infectivity, but fortunately no evidence of a more intense illness, higher severity, or greater mortality than observed with the prior subvariants [4].

Identifying individuals at increased risk

Healthcare professionals, particularly those in test centers, laboratories, or specialized COVID-19 wards, or those who treat critically ill COVID-19 patients in intensive care units, are in danger of

Table 2 European Medicines Agency (EMA)-authorized COVID-19 vaccines in the European Union/European Economic Area (EU/EEA), updated 15 November 2022 (adapted from [5])

COVID-19 vaccines	Omicron adapted COVID-19 vaccines
Comirnaty (BioNTech)	Comirnaty Original/Omicron BA.1 (BioNTech)
Spikevax (Moderna)	Comirnaty Original/Omicron BA.4-5 (BioNTech)
COVID-19 Vaccine (Valneva)	Spikevax bivalent Original/Omicron BA.1 (Moderna)
Jcovden (Janssen/J & J)	Spikevax bivalent Original/Omicron BA.4-5 (Moderna)
Nuvaxovid (Novavax)	
Vaxzevria (AstraZeneca)	
VidPrevtyn Beta (Sanofi Pasteur)	

becoming infected. ■ **Table 1** lists underlying medical conditions associated with an increased risk of getting very sick, being hospitalized, or dying from COVID-19 (conditions are not in order of risk and there is no claim to completeness; [5].) Age is a leading risk factor, with the number of deaths among people over age 65 being 97 times higher than the number of deaths among people aged 18–29 years.

Face masks and hygiene

Because the SARS-CoV-2 coronavirus is mainly spread by aerosol formation in the respiratory air, FFP2 (Filtering Facepiece 2, European standard), N95 (US standard), and KN95 (Chinese standard) face masks remain the simplest measure of protection. Surgical masks are not a safe alternative. The coronavirus can penetrate surgical masks because of its average diameter of only 80–120 nm. However, any mask is better than no mask. The efficacy of face masks in protecting against respiratory infections has been demonstrated in a very impressive way, by the seasonal flu (influenza) waves during winter 2020/2021 and 2021/2022 having been almost completely prevented by face masks. After relaxing public face mask restrictions in 2022, many hospitals were again overcrowded in November/December 2022 due to respiratory infections including influenza, respiratory syncytial virus (RSV) in children and adults, and the latest SARS-CoV-2 omicron subvariants. In February 2023, the recommendations regarding where and when face masks should be worn by healthcare personnel and patients were a point of contention. Most hospitals and medical institutions still insist on face masks for personnel and patients. All other hy-

giene measures as described elsewhere [3] remain unchanged. These measures include meticulous hygiene and disinfection of medical equipment and rooms after every patient as well as segregation and distancing of at least 6 feet between patients and, whenever possible, between medical personnel and patients. In Germany, seasonal and institutional recommendations for hygiene measures or for individual protection by FFP2, N95, or KN95 face masks must follow the updated coronavirus protection regulations (*Coronavirus-Schutzverordnungen*).

Coronavirus warning app and other apps

The Coronavirus warning app (Corona Warn-App) was released by the German Robert Koch Institute and authorized by the German government on 16 June 2020 (■ **Fig. 1**; [6]). It helps to quickly disrupt chains of infection. The app is based on a decentralized approach using Bluetooth low-energy technology and turns your smartphone into a warning system with preserved data protection, because the Corona Warn-App does not know the identity of the smartphone user. The app informs the user whether he or she has had contact of less than 6 feet for at least 15 min with a person diagnosed with COVID-19, and it provides clear recommendations on what to do. The user will remain anonymous at all times. The Luca app is a comparable private development mainly for guest registration and cluster tracing in restaurants and hotels. The CovPass app was developed for the QR code-based digital storage of vaccination certificates and the documentation of vaccination status as well as of recovery from Coronavirus infection at any time.



Fig. 1 ▲ Coronavirus warning app. The app is based on a decentralized Bluetooth low-energy technology and informs the user whether he or she has had contact of less than 6 feet for at least 15 min with a person diagnosed with COVID-19. The user remains anonymous at all times. (Adapted from [6])

All apps are able to exchange data with local health authorities and can be downloaded for free. The public acceptance of most contact tracing apps, however, has been rather limited, mainly because of major concerns about their privacy and security, but also because of doubts about their effectiveness. For effective contact tracing the Corona Warn-App must be installed on every participating smartphone and all infected individuals must be tested and their data must be entered. Many older high-risk individuals aged over >60 years, however, are not familiar with the sophisticated use of smartphones and smartphone apps.

Preventive testing

Testing is recommended in individuals who have typical symptoms of COVID-19 or after contact with persons with confirmed COVID-19. Additional preventive testing two to three times per week for healthcare personnel, on the day of hospital admission for patients, and upon facility entry for visitors has been routinely performed or has been requested from external test centers in most medical institutions. There are two main types of viral tests: nucleic acid amplification tests (NAATs), also called polymerase chain reaction (PCR) tests, and antigen tests. The NAATs are typically the most reliable tests for people with or without symptoms. These tests detect viral

genetic material, which may remain up to 90 days after testing positive. Therefore, NAATs should not be used after a confirmed COVID-19 infection in the last 90 days. Antigen tests are less reliable than NAATs, especially for people who are asymptomatic. A single negative result via antigen testing does not rule out infection. To best detect infection, a negative antigen test should be repeated at least 48 h later (known as serial testing). A follow-up NAAT may be recommended to confirm an antigen test result.

Vaccination as the most effective protection

Vaccination is regarded as the most effective protection against COVID-19. COVID-19 vaccines significantly lower the risk of getting very sick, being hospitalized, or dying from COVID-19 [7–10]. However, studies show that vaccination protection decreases over time and that the immune response is weaker in those who, for example, are older or have preexisting conditions. On 15 November 2022, there were seven vaccines approved or authorized by the European Medicines Agency (EMA) in the European Union (EU)/European Economic Area (EEA): Comirnaty (BioNTech), Spikevax (Moderna), COVID-19 Vaccine (Valneva), Jcovden (Janssen/Johnson & Johnson), Nuvaxovid (Novavax), Vaxzevria (AstraZeneca), and VidPrevtyn

Beta (Sanofi Pasteur; ■ Table 2). However, only four omicron adapted vaccines have been approved by the EMA: Comirnaty Original/Omicron BA.1 (BioNTech), Comirnaty Original/Omicron BA.4-5 (BioNTech), Spikevax bivalent Original/Omicron BA.1 (Moderna), and Spikevax bivalent Original/Omicron BA.4-5 (Moderna). All vaccines can be classified into three subgroups: live virus vaccines, inactivated/killed vaccines, and genetic vaccines. The general recommendation of the WHO is that countries should continue to work toward vaccinating at least 70% of their populations, prioritizing the vaccination of 100% of healthcare workers and 100% of the most vulnerable groups, including people who are over 60 years of age and those who are immunocompromised or have underlying health conditions [7]. As of 17 February 2023, the current vaccination status in Germany is as follows: 64.9 million people (77.9% of the population) have received a vaccine dose to date. Of these, 63.6 million (76.4%) have received basic immunization, 52.1 million (62.6%) have additionally received a booster vaccination, and 12.6 million (15.1%) have received at least two boosters. Currently, 18.4 million people are still unvaccinated (22.1% of the population; [11]). There is wide variance in the vaccination status of different federal states in Germany, spanning from 91.9% in Bremen to only 66.3% in Saxony. For political reasons, a general coronavirus vaccine mandate would be impossible in Germany. An institution-related federal employee vaccine mandate for all medical institutions and residential care homes effective 16 March 2022, was issued by the German government but sanctions against anti-vaccinationists among medical professionals were rarely enforced because of the critical shortage of healthcare personnel in all medical institutions. Boosters are an important part of protection from becoming seriously ill or dying from COVID-19. People should receive one updated (bivalent) booster if they are eligible, including those who are moderately or severely immunocompromised. The Standing Commission on Vaccination (STIKO) recommends that everyone aged 18 and over get a booster jab at least 3 months after their last vaccination. The

second booster vaccination should occur no sooner than 6 months after the first booster vaccination. In justified individual cases, the interval may be reduced to 4 months. Even after a SARS-CoV-2 infection, a regular interval of 6 months should be observed for a booster vaccination. If a SARS-CoV-2 infection has occurred after receiving the first booster vaccination, the second booster vaccination should be administered 6 months after the infection. Side effects that occur within 7 days of getting vaccinated are common but are mostly mild. Systemic side effects (such as fever, chills, fatigue, and headache) are more common after the second dose of a BioNTech, Moderna, or Novavax COVID-19 vaccine. Severe allergic reactions to vaccines are rare but can happen. There is a rare risk of myocarditis and pericarditis associated with mRNA COVID-19 vaccination, mostly among males aged 12–39 [12]. The rare risk may be reduced with a longer interval between the first and second dose. Cases of myocarditis and pericarditis have also been reported in people who received the Novavax COVID-19 vaccine. There is a potential cause-and-effect relationship between the Janssen (Johnson & Johnson) COVID-19 vaccine and a rare and serious adverse event, thrombosis with thrombocytopenia syndrome (TTS). This syndrome occurs in about 4 per 1 million cases of Janssen (Johnson & Johnson) doses and has resulted in deaths. Because of this risk, vaccination with COVID-19 vaccines other than the Janssen (Johnson & Johnson) vaccine is preferred. The present expert opinion is that the coronavirus will most likely never be totally eliminated by vaccination, but instead will come back in seasonal waves probably with new variants similar to the seasonal flu, requiring variant adapted booster vaccinations as a refresher in vulnerable individuals.

Conclusion

Vaccination is regarded as the most effective protective measure against COVID-19. The general recommendation of the World Health Organization is that countries should continue to work toward vaccinating at least 70% of their populations, prioritizing the vaccination of 100% of healthcare workers and 100% of the most vulnerable groups,

Schutz von Gesundheitspersonal und Patienten über 3 Jahre COVID-19. Wirksamer Schutz durch Masken und Hygiene: Was war sonst noch wirksam?

Für das Personal im Gesundheitswesen, besonders in Testzentren, Laboren oder auf speziellen COVID-19-Stationen, besteht das Risiko, sich zu infizieren. Patienten mit speziellen Grunderkrankungen weisen ein erhöhtes Risiko auf, schwer zu erkranken, stationär behandelt zu werden oder an COVID-19 zu sterben. In diesem Zusammenhang stellt das Alter einen führenden Risikofaktor dar. Derzeit bleiben FFP2- („Filtering Facepiece 2“, europäischer Standard), N95- (US-Standard) und KN95- (chinesischer Standard) Gesichtsmasken die einfachste Schutzmaßnahme. Auf Smartphones installierte Coronavirus-Warn-Apps sind zur anonymen Kontaktverfolgung und schnellen Unterbrechung von Infektionsketten empfohlen worden. Präventives Testen 2- oder 3-mal wöchentlich für das Personal im Gesundheitswesen, am Tag der Krankenhausaufnahme für Patienten und bei Betreten der Einrichtung für Besucher ist routinemäßig durchgeführt worden, oder es wurde eine Bescheinigung von externen Testzentren in den meisten medizinischen Einrichtungen verlangt. Jedoch gilt die Impfung als die wirksamste Schutzmaßnahme gegen COVID-19. Die allgemeine Empfehlung der Weltgesundheitsorganisation lautet, dass die Länder weiter daran arbeiten, mindestens 70% ihrer Bevölkerung zu impfen, wobei die Impfung von 100% des Personals im Gesundheitswesen und 100% der am stärksten vulnerablen Gruppen priorisiert wird, einschließlich Menschen über 60 Jahre und Personen mit Beeinträchtigung des Immunsystems oder bestimmten Grunderkrankungen. Die am stärksten gefährdeten Personen unter den Patienten und dem medizinischem Personal sollten ermittelt und dann ihr Impfstatus geprüft sowie ggf. durch Verabreichung einer Auffrischungsimpfung optimiert werden. In Deutschland müssen die saisonalen und institutionellen Empfehlungen für den persönlichen Schutz durch Gesichtsmasken, für Hygienemaßnahmen und für präventives Testen entsprechend den aktualisierten Coronavirus-Schutzverordnungen eingehalten werden.

Schlüsselwörter

SARS-CoV-2 · Personal im Gesundheitswesen · Immungeschwächter Patient · FFP2-Gesichtsmasken · Impfung

including people who are over 60 years of age and those who are immunocompromised or have underlying health conditions. The most vulnerable individuals among patients and healthcare workers should be identified and then their vaccination status should be checked and, if necessary, optimized by booster administration. In Germany, seasonal and institutional recommendations for individual protection by FFP2, N95, or KN95 face masks, for hygiene measures, and for preventive testing must follow the updated coronavirus protection regulations (*Coronavirus-Schutzverordnungen*).

Corresponding address

Rolf Dörr, MD
MVZ Praxisklinik Herz und Gefäße
Forststraße 3, 01099 Dresden, Germany
doerr@praxisklinik-dresden.de

Declarations

Conflict of interest. R. Dörr declares that he has no competing interests.

For this article no studies with human participants or animals were performed by any of the authors. All studies mentioned were in accordance with the ethical standards indicated in each case.

References

1. WHO (2023) WHO coronavirus (COVID-19) dashboard. <https://covid19.who.int/>. Accessed 18 Feb 2023
2. Robert Koch-Institut (2023) COVID-19 Fallzahlen in Deutschland und weltweit. Fallzahlen in Deutschland. Stand: 17.02.2023, 00:00 Uhr. https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Fallzahlen.html. Accessed 18 Feb 2023
3. Dörr R (2020) Protecting patients and healthcare personnel from COVID-19: considerations for practice and outpatient care in cardiology. *Herz* 45(4):319–320. <https://doi.org/10.1007/s00059-020-04922-2>

4. Quarleri J, Galvan V, Delpino MV (2022) Omicron variant of the SARS-CoV-2: a quest to define the consequences of its high mutational load. *Geroscience* 44(1):53–56. <https://doi.org/10.1007/s11357-021-00500-4>
5. Centers for Disease Control and Prevention (CDC) (2023) People with certain medical conditions. <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html>. Accessed 18 Feb 2023
6. Die Bundesregierung (2023) Coronavirus warning app. <https://www.bundesregierung.de/breg-de/themen/corona-warn-app/corona-warn-app-englisch>. Accessed 26 Feb 2023
7. WHO (2023) COVID-19 vaccines. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines>. Accessed 18 Feb 2023
8. Centers for Disease Control and Prevention (CDC) (2023) Vaccines for COVID-19. <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>. Accessed 18 Feb 2023
9. Paul-Ehrlich-Institut – Bundesinstitut für Impfstoffe und biomedizinische Arzneimittel (2023) Coronavirus und COVID-19. <https://www.pei.de/DE/newsroom/dossier/coronavirus/coronavirus-inhalt.html>. Accessed 18 Feb 2023
10. Robert Koch-Institut (2023) COVID-19-Impfempfehlung (Stand: 07.02.2023). https://www.rki.de/SharedDocs/FAQ/COVID-Impfen/FAQ_Liste_STIKO_Empfehlungen.html. Accessed 19 Feb 2023
11. Bundesministerium für Gesundheit (BMG) (2023) Together against corona. Current vaccination status in Germany (as of February 17, 2023). <https://impfdashboard.de/en/>. Accessed 19 Feb 2023
12. Wong HL, Hu M, Zhou CK et al (2022) Risk of myocarditis and pericarditis after the COVID-19 mRNA vaccination in the USA: a cohort study in claims databases. *Lancet* 399(10342):2191–2199. [https://doi.org/10.1016/S0140-6736\(22\)00791-7](https://doi.org/10.1016/S0140-6736(22)00791-7)

Dr. Mark Weinert
Der 1-Minuten-Arzt: Einfach. Besser. Kommunizieren.

Das Praxisbuch für Menschen im Gesundheitswesen

Why Not Publishing 2023, 292 S., (ISBN: 978-3347878167), 49,90 EUR



Der 1-Minuten-Arzt: Sicher und besser kommunizieren, für weniger Sand und mehr Öl im Getriebe.

Dieses Buch vermittelt auf erfrischend umgangssprachliche Weise, worauf es bei der Kommunikation in der Medizin ankommt – dass es nun mal um mehr geht als um das einfach gesprochene Wort. Warum ist es wichtig, zwischen Empathie, Mitgefühl und Mitleid zu unterscheiden? Inwiefern spielen Emotionen eine Rolle und kann man Kommunikation wirklich lernen? Was ist eine „Closed-Loop-Kommunikation“, wie gebe ich am besten ein Feedback und auf welche Art und Weise kann es mir gelingen, schlagfertig zu sein, obgleich es mich in einer Diskussion kurzzeitig innerlich zu zerreißen droht? Durch praktische Beispiele sehen sich Ärztinnen und Ärzte mit diesem Buch schnell in Situationen versetzt, die ihnen aus dem Alltag bekannt vorkommen. Hierbei werden alle wesentlichen Themen berücksichtigt und alle wesentlichen Fragen rund um das Thema Kommunikation in der Medizin beantwortet.

Das Buch behandelt unter anderem die Kommunikation im Notfallmanagement, die kommunikativen Aspekte in der Arzt-Patienten-Beziehung, beinhaltet Tipps und Tricks für die Führung von Mitarbeitenden, Gespräche mit Angehörigen, adressiert die Kommunikation mit den Medien und Jurist:innen und so vieles mehr, was viele sich wohl bereits im Medizinstudium gewünscht hätten.