



VACCINATION AGAINST THE NEW CORONAVIRUS (SARS-COV-2) - PROTECTION AGAINST SERIOUS ILLNESS AND DEATH OR THE POSSIBILITY TO CONTROL THE PANDEMIC

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ABSTRACT

A number of pandemics have been known throughout the human history, and there is no doubt that vaccination is at the root of minimizing the spread or even actual disappearance of a number of infectious diseases. In 2020 the infection with the new coronavirus (SARS-CoV-2) quickly became a pandemic. High hopes had been placed on the vaccination to reduce the severity of the clinical course and duration of infectivity of those infected and to reduce the pandemic. The COVID-19 vaccines have been developed for much shorter periods than usual and have been approved for emergency use worldwide. However, a number of problems arise for the global vaccination of the population. A rapid and comprehensive vaccination has proved impossible (both for individual countries and for the countries worldwide in general). The emergence of new variants of SARS-CoV-2, along with hesitation, lack of activity and motivation or refusal of many people to be vaccinated probably also limits the effect of the vaccination. Moreover, the effectiveness of the already developed vaccines on the new variants, as well as the dynamics of the SARS-CoV-2 transmission, do not yet seem to be fully understood. On the other hand, the SARS-CoV-2 infection may be completely asymptomatic or oligosymptomatic and not always with the same typical initial symptoms. There is no reliable evidence that the vaccination will overcome the possibility of asymptomatic carriers to transmit the infection. Healthcare workers are known to be at increased risk of infection, and if the control is directed only at patients with COVID-19, the efforts will be ineffective with regards to limiting the spread of the SARS-CoV-2 infection. We believe that the effective infection control requires strict adherence to generally accepted infection control measures, including those vaccinated against SARS-CoV-2.

Key words: SARS-CoV-2, COVID-19, vaccination, asymptomatic infection, healthcare

In 2020, the infection with the new coronavirus (SARS-CoV-2) quickly spread to many countries and all populated continents, thus becoming a pandemic. As of 31.08.2021 the total number of reported cases of SARS-CoV-2 infection worldwide is close to 216 million, and the total number of COVID-19 deaths is almost 4.5 million (1).

Worldwide, cases of alpha variant have been reported in 193 countries (one new country), territories or districts. Beta cases have been reported in 141 countries, gamma cases have been reported in 91 countries (five new countries) and Delta cases have been reported in 170 countries (seven new countries). The global risk to public health caused by the new variants of SARS-CoV-2 persists.

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The SARS-CoV-2 virus has evolved and new variants continue spreading. A variant 'Mu' has also been reported(1), which has mutations indicating potential immune escape properties

(escape of the virus from recognition and destruction by the immune system) and a reduction in the neutralizing capacity of sera of convalescent and vaccinated patients, similar to that observed in the beta variant. A number of pandemics have been known throughout human history, and there is no doubt that vaccination is at the root of minimizing the spread or even the actual disappearance of a number of infectious diseases. In addition, vaccination is one of the most cost-effective public health interventions, ensuring public health, but it can also significantly reduce future healthcare costs (2, 3). Logically, high hopes were placed on vaccination to reduce the severity of the clinical course and duration of infectivity of those infected, to slow the spread of the infection, and to reduce the pandemic. The COVID-19 vaccines have been developed for much shorter period than the usual (4) and have been approved for emergency use worldwide (5). However, a number of problems arise for the global vaccination of the population. A rapid and comprehensive vaccination has proved impossible (both for individual countries and for countries worldwide in general). The emergence of new variants of SARS-CoV-2 (6-8), hesitation, lack of activity and motivation, or the refusal of many people to be vaccinated (8-10) probably also limit the effect of vaccination. In addition, the efficacy of the vaccines already developed on the new variants and the dynamics of SARS-CoV-2 transmission have not yet been fully elucidated.

On the other hand, the SARS-CoV-2 infection may be completely asymptomatic or oligosymptomatic and may not always be present with the well-known typical initial symptoms (11, 12). Asymptomatic carriers of SARS-CoV-2 can spread the infection (13-15) and up to 40% of SARS-CoV-2 transmission is linked to asymptomatic or pre-symptomatic cases (16). There is also no reliable evidence that the vaccination definitely prevents infection and overcomes the possibility asymptomatic carriers to transmit the infection. It is still being discussed and investigated whether the vaccinated individuals can be infected and transmit the infection (7) and if the control is directed only at patients with COVID-19 (infected with clinical manifestations), the efforts to limit the spread of SARS-CoV infection-2 will be ineffective.

A higher risk of infection and a higher incidence of COVID-19 have been reported among health care workers (17-20). Emphasis is placed on the need to identify asymptomatic medical professionals in the hospitals to prevent the spread of COVID-19 and this approach is identified as crucial for the protection of patients and hospital staff (21). The identification of individuals in whom the SARS-CoV-2 infection is asymptomatic or of those with mild clinical manifestations of COVID-19 may be difficult.

Our observations for almost one year have shown some problems in this aspect. Some of our hospitalized patients (47 people) due to worsening of pre-existing CVD and/or with complaints, typical for a heart disease, are afebrile at the hospitalization and answered negatively to the questions from the unified questionnaire for contact identification of COVID-19 and of suspected SARS-CoV-2 infected patients. No radiographic changes characteristic of COVID-19 were observed in these patients. However, all hospitalized patients in the clinic were tested for SARS-CoV-2. Consequently, the routine SARS-CoV-2 (PCR) test in these 47 patients showed a positive result.

An asymptomatic infection has the potential for unrecognized spread of the infection (22) and is difficult to control. Undoubtedly, the control measures are crucial for limitation of the spread of the pandemic infections. However, with a relatively high proportion of asymptomatic carriers (up to 50%) (22-25), if the anti-epidemiological control is based only on traditional measures for investigation of symptoms, contact monitoring and testing for SARS-CoV-2 of the contact persons, such measures are likely to be less effective. In addition, the recommended anti-epidemic measures are not followed after vaccination (26), probably because of created false feeling among the vaccinated to think that they definitely cannot be infected by the virus after vaccination.

When inhaling a small amount of aerosols (27) containing the new coronavirus SARS-CoV-2, it is logical that there is a greater likelihood of effective protection by the immune system and, accordingly, an unfavorable course of the infection is less likely. The immune system is not

able to prevent with certainty the SARS-CoV-2 infection. However, the immune system is only one of the important factors influencing the possibilities and prognosis for infection with SARS-CoV-2.

A facial mask (28, 29) potentially limits the spread of the COVID-19 virus by asymptomatic and pre-symptomatic individuals who may cause nearly 60% of COVID-19 cases (30, 31).

In our opinion it's necessary to wear personal protective equipment (masks) in accordance with the rules of use, to keep a distance, to limit unprotected contacts and their unreasonable duration, to comply with the rules of personal hygiene, including those who suffered from COVID-19 and the vaccinated individuals, especially in health care settings, in environments with high concentration of individuals at increased risk for an unfavorable prognosis of the infection.

We suppose that the effective infection control requires strict adherence to generally accepted measures to control the airborne infections, including by those who have suffered from COVID-19 and/or have been vaccinated against SARS-CoV-2, especially when there is a lasting tendency for the epidemiological situation to worsen.

By timely testing and identification of SARS-CoV-2 infected patients subject to hospitalization, the spread of the infection can be further reduced. The correct, comprehensive and timely identification of the many and varied clinical manifestations of COVID-19 among hospitalized patients (especially if it is impossible or difficult to tests all hospitalized for SARS-CoV-2) is a prerequisite for providing better and timely medical care for patients with COVID-19, and better protection for the medical professionals, to prevent nosocomial spread of the infection, thus reducing the burden on the hospital system.

The COVID-19 pandemic has changed more than just the way people live. In the situation of stability of the pandemic spread of the SARS-CoV-2 infection, it is imperative that the measures to limit the spread of the infection are

based on the growing knowledge about the specifics of the spread of infection.

Mass vaccination against the new coronavirus (SARS-CoV-2), which provides collective immunity, has not yet been achieved and, under these conditions, there are still some problems and important unanswered questions. One of these problems is that most infected people have no symptoms but can spread the infection. It is also unclear to what extent the vaccination affects the spread of the infection. If the vaccination against SARS-CoV-2 can provide a reduction in the severity of the infectious disease, of the development of complications and save lives, there is no definitive positive answer whether it will provide such immunity that prevents or limits the duration of infectivity. It is also unclear to what extent the existing vaccines provide effective immunity against emerging variants of SARS-CoV-2. There is clearly a long way to go before collective immunity is achieved worldwide, given the emerging variants of SARS-CoV-2. In this situation, with dynamic modern life and free movement of people, although a high relative share of vaccination has been achieved in some countries, the vaccinated individuals must also still commit to complying with the anti-epidemic measures to limit the spread of the infection.

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GRIGOROV F., et al.