

# The Use of Masks by Medical University Students during A Pandemic as a Means of Non-Specific Coronavirus Infection Prevention

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**Abstract:** During a pandemic, it is necessary to pay close

attention to the measures of non-specific prevention of infection emergence in the population. The objective of a Study was to get understanding of the significance of the recommendations of WHO, and Rospotrebnadzor on the use of face masks and their implementation during a pandemic by medical university students. The questionnaire method was used. 75.4% of the surveyed consider wearing masks an adequate measure to combat COVID-19. At the same time, 94.9% wore a mask during the period of severe restrictions from March to June 2020, observing the security measures adopted in the country. During the period of easing restrictions from June to September, this percentage dropped to 69.7, and in the period when students started full-time studies at the university (from September to October), it reached 99%. 100% wear a mask within the walls of the university. Most of the respondents believe that disposable fabric masks are ineffective for protection against bacteria and viruses, but wearing them is justified in terms of protecting against the ingress of saliva and mucus particles into the body of the wearer and into the environment. 83.7% believe that wearing masks during a pandemic is necessary for the entire population. 2/3 of students are aware of the rules for using masks. The main reasons for refusing to use masks are difficulty in breathing and vision. Disposable medical masks were the most popular type of masks. Skin reactions to wearing masks were noted by 65% of the students. The most common side effects were redness, dryness, and itching of the skin, as well as the appearance of rashes. Conclusions: medical students believe that wearing face masks during a pandemic is an adequate response to COVID-19 and have the knowledge to carefully select and use personal protective equipment. Most of the respondents have a civic responsibility, understand the value of masks, and can actively promote their use among the population.

**Keywords:** COVID pandemic; face mask; protective measures; medical students

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## 1. Introduction

The coronavirus pandemic has posed a serious challenge to humanity. The number of sick people is estimated at tens of millions, deaths are close to 1.5 mln. Most countries have entered the second wave of sickness Rate growth, and in 2021 its third rise is predicted. For almost a year, scientists around the world have been actively developing effective vaccines and drugs. At the same time, even the creation of specific means of preventing COVID-19 may be insufficient to completely overcome the spread of the epidemic process. Due to several objective and subjective reasons, it is quite difficult to cover a large part of the population with vaccination in a short time: it is necessary to bear in mind the

contraindications, chronic diseases, and a negative attitude of a number of citizens to vaccination. The current situation, as never before, shows importance of non-specific preventive measures which include, first of all, the use of face masks by the population.

Until now, the use of masks has been indisputable and completely justified among medical staff, especially in relation to surgeons, obstetricians, dentists, and infectious disease specialists. In this case, masks are considered as one of the main means of non-specific prevention of infections associated with medical care provision. This is personal protective equipment intended to reduce the risk of transmission of airborne infections both in relation to patients (a potential source of infection – a doctor) and medical personnel (a source of infection - a patient) [1,2].

The realities of our days put forward the problem of using masks among the entire population as one of the most important measures to counter the spread of coronavirus infection. Despite the controversial attitude towards the widespread use of masks of various types in terms of their effectiveness against viruses [3], the vast majority of authors consider their use to be justified during a pandemic [4–8].

Approaches to solving the problem of widespread use of protective masks at the state level in different countries significantly differ from each other. In some, they are advisory in nature, in others, tough sanctions are introduced, which is more related to the current epidemic situation [9,10].

In its bulletins, WHO repeatedly emphasizes that wearing masks is not guaranteed protection against COVID-19, however, it significantly reduces the risk of infection emergence in the population [11]. WHO considers it advisable for medical personnel to wear masks in their professional activities, as well as for people with symptoms of airborne infections, people who care for the sick persons, persons over 60 years old, and persons suffering from chronic diseases [12]. Recently, due to the increase in morbidity, this list has been significantly expanded. It is recommended to use masks outdoors in case of impossibility to maintain social distance. So, for instance, in most constituent entities of the Russian Federation, in accordance with the decrees of Rospotrebnadzor, as well as local authorities, a mandatory mask regime has been introduced in public transport, and at all facilities related to the service sector.

However, the measures being introduced are not always properly perceived by the population, even though there are penalties for failure to comply with them.

The reasons for such a situation are often rooted in a frivolous attitude towards their health, lack of trust in the media, negative reactions to prohibitive and restrictive measures, as well as insufficient public awareness of the effectiveness of using masks. Refusal of wearing masks can often be associated with inconvenience and problems that arise when wearing them [13], including skin reactions [14].

At the same time, a large number of people consider the mask as a means of their personal protection only, i.e. “my health concerns only me.” [15]. The almost complete absence of the culture of wearing masks, which is characteristic of the inhabitants of most European countries, in contrast to, for example, the inhabitants of Asia, also contributes to it [9].

The current situation requires mobilization of the efforts of all society’s citizens to form a conscious attitude both to the restrictive measures introduced during the pandemic and in the future to situations in which wearing protective equipment in public places is necessary, primarily, from the standpoint of caring for others. The leading role is assigned to medical staff [16], including medical students, as one of the main categories of the population which by its personal example can contribute to the formation of the population’s attitude to combating the infection.

The objective of our study was to get the understanding of the significance of the recommendations of WHO, and Rospotrebnadzor on the use of face masks and their implementation during the COVID-19 pandemic by medical university students.

## 2. Materials and Methods

The Study involved 228 3-year students of the Institute of Clinical Medicine of the I.M. Sechenov First Moscow State Medical University after selected by random sampling from the total number of students. All the students during the period stated in the questionnaire stayed either in Moscow or in the Moscow Region. The respondents did not have any chronic diseases of the respiratory and cardiovascular systems. The Study covered three periods due to the epidemic situation in Moscow at that time: severe restrictions (from March to June 2020), when students were self-isolated and had distance learning; from July to August 2020 – removal of restrictions on movement, vacations, while maintaining the mask regime; and from September to October 2020 – the period of return to full-time training, while maintaining the mandatory mask regime.

The questionnaire included general questions (gender, age); questions about personal mask wearing in public places during different periods of the pandemic; awareness and implementation of the mask wearing rules; awareness of the effectiveness of the mask use in relation to various microorganisms; the reasons that guided the students when choosing the types of protective masks, and readiness to promote mask wearing among relatives and friends. A whole set of questions was devoted to identifying adverse reactions of the respondents' bodies when wearing protective equipment, including skin manifestations.

### 3. Results and Discussion

The personal data of the research participants – 181 females and 47 males – were analyzed.

Three quarters (75.4%) of the surveyed consider wearing masks an adequate measure to combat COVID-19. Even though a quarter of respondents doubted the effectiveness of using masks, 94.9% wore them during the period of severe restrictions due to the pandemic from March to June 2020, observing the security measures adopted in the country (Table 1).

**Table 1.** Number of students who wear masks during different periods of the pandemic (%).

Pandemic period 2020	All the students (n * = 228)	Females (n = 181)	Males (n = 47)
March–June	94,9	93,6	100
July–August	69,7	67,9	75,0
September–October	99,0	98,7	100

n \* – number of study participants

During the easing of restrictions from June to August, this figure dropped to 69.7%, which may be due to an improved epidemic situation, and some complacency of respondents that arose against this background, as well as hot weather, when wearing masks can be difficult [12]. However, during the period when students started full-time studies at the university (September – October), the number of people using the masks regularly reached its maximum, i.e. 99%. Although in all periods the percentage of males wearing masks was slightly higher than that of females, this difference was statistically insignificant, i.e. mask wearing does not depend on gender, which is consistent with the literature data [17].

All respondents wear a mask within the walls of the university, which is a mandatory requirement for all students and the entire research and teaching staff.

Three quarters (74.5%) of respondents wear masks as they consider it mandatory for themselves to comply with the security measures adopted in the country, 17.3% – because of the possibility of being subject to penalties in connection with violations of these measures. Difficulty breathing (85.7%) and vision due to fogging of glasses (40.8%) were indicated as the main reasons for refusing to use masks, only 10.2% consider the requirement to wear masks as a restriction of their personal freedom.

Skin reactions to wearing masks were noted by 65% of the students. 38.9% of them noticed the appearance of the first signs of skin manifestations already on the first day, 25% – in a day, 11.1% – in a week, and 19.4% – in a month after wearing the personal protective equipment (PPE) in question. The most common adverse symptoms were redness (57.1%), dryness (27.1%) and itching of the skin (38.6%), as well as the appearance of rashes (61.4%). 43.1% of the respondents had to use cosmetic and medical products after wearing masks, 18.9% – consulted specialists. What is remarkable, despite the appearance of these symptoms, more than half of the students (51.4%) continued to wear masks, believing that personal inconveniences in such a situation are less important than safety. And only 12.2% of students noted that they had stopped using masks. The authors of the review believe that any discomfort (headache, skin manifestations) is observed primarily in those who have already suffered from headaches or had skin problems before the pandemic. The authors associate the appearance of such conditions for the first time during the pandemic to a greater extent with the design of the mask (tight elastic straps combined with a tight fit) and prolonged wearing (more than 4 hours) of FFP2 (N95) respirators, which raised the skin temperature above 34.5 °C. Given the importance of this aspect of adverse reactions, we consider it necessary to conduct additional research with the involvement of dermatologists and correlation assessment of the types of masks used, adherence to recommendations for their use, considering an allergic history, concomitant diseases, and identified pathology associated with wearing masks.

Disposable medical masks were the most popular type. They were preferred by 90.2% of the respondents. This was followed by reusable fabric masks (27.2%), and FFP2/FFP3 disposable respirators (10.9%).

For 58% of students, the determining factor in choosing a means of protection was mainly the low price (or the possibility of receiving it free of charge). At the same time, possibility of skin reactions to wearing (50%), considering the degree of protective properties of masks (46.6%) and their appearance (11.4%) turned out to be less significant. These results, of course, should be considered regarding the long-term prospects for production of masks in the country and the search for a reasonable “price – quality” compromise with commitment, first of all, to the poorest category of the population.

Most of the respondents have adequate knowledge of the protective properties of PPE and believe that wearing disposable medical masks is justified primarily in terms of protection against the ingress of saliva and mucus particles both into the body of the wearer and into the environment (92.8%.) However, 30.6% of respondents believe that this type of mask serves as reliable protection against bacteria, and 21.4% – against viruses. Despite the controversial attitude of various researchers to the widespread use of masks of various types in terms of their effectiveness against viruses, most authors consider their use during a pandemic justified.

Students called a FFP2/FFP3 disposable respirator the most preferable means in terms of holding off viruses (76.5%). At the same time, 7.1% of the respondents believe that cloth masks, and even gauze bandages (5.1%) effectively protect against viruses.

Knowledge of the rules for using masks was demonstrated in relation to a disposable medical mask: 70.2% of respondents correctly indicated the permissible duration of wearing it. For filtering respirators of any type, this indicator was 42.1% only.

The overwhelming majority of respondents (84.9%) correctly wear a mask: it covers their mouth, nose and chin, tightly fitting to their face.

To a much lesser extent, the rules were followed regarding the recommended duration of wearing a disposable mask. Only 15.9% changed the mask after 2 hours of wearing, 31.8% wore a disposable mask for more than 2 hours or did not change it during the day. A new mask was put on by this category the next day only, and 20.5% used a disposable mask for 2 hours or more for several days. Such a dissonance between knowledge and adherence to the rules may be associated with underestimation of the danger for oneself rather than a financial component: the price of disposable masks is quite low.

More than a third of the students using reusable cloth masks washed and ironed them on both sides in a timely manner every day, 28.6% – daily washed them only. However, the same number of respondents (28.6%) washed their masks once a week only, being guided not by the decrease in the protective properties of the mask over time, but by the appearance of visible signs of its contamination.

83.7% of respondents consider wearing masks during a pandemic mandatory for the entire population, and not only for patients with infectious diseases, or for those in contact with sick people. The overwhelming majority (88.8%) is ready to recommend their use to relatives and friends. However, the Study conducted showed that not all the students have the necessary knowledge to carry out competent sanitary and educational work regarding the rules for using masks. In this regard, we consider it necessary to introduce a special module on non-specific prevention into the training programs for doctors in the study of the Hygiene discipline. These recommendations are fully in line with the actions of WHO, the Academy of which offers a special training course for medical staff on the use of personal protective equipment using augmented reality technologies [11].

#### 4. Conclusions

Medical students believe that wearing face masks during a pandemic is an adequate response to COVID-19 and they show sufficient knowledge that enables them, in general, to correctly select and use personal protective equipment.

Most of the respondents have civic responsibility and understand the importance of using masks not so much for personal protection as for protecting others and can actively promote their use among the population.

An in-depth study is required to evaluate possible adverse skin reactions to wearing various types of protective equipment.

It is necessary to introduce in the curricula for training doctors a special course on measures for non-specific prevention of epidemics in general, and as the most important area - on combating the Covid-19 pandemic.

**Author Contributions:** Conceptualization, O.V. Mitrokhin, E.A. Shashina, V.V. Makarova; methodology, E.A. Shashina, V.V. Makarova; validation, O.V. Mitrokhin; formal analysis, E.A. Shashina; investigation, E.A. Shashina, V.V. Makarova; data curation, E.A. Shashina; writing – original draft preparation, V.V. Makarova; supervision, O.V. Mitrokhin; project administration, O.V. Mitrokhin.

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

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