Qualitative study on the social meanings of using mask during COVID-19 outbreak: implications for infection control

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Research Article

Keywords: Infectious diseases, COVID-19, Public health, Mask, Risk perception

Posted Date: April 21st, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-23961/v1>

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Abstract

Background: To analyze the perceptions and behaviors related to mask-using in non-medical staff. To protect against respiratory and provide insights on using mask and provide directions for the prevention of infection and health protection.

Methods: We conducted semi-structured interviews with 24 non-medical staff from various backgrounds to reflect a diversity of viewpoints during the peak season of coronavirus disease 2019(COVID-19) since February to March in 2020. A phenomenological approach was adopted for data analysis.

Results: Multiple themes emerged: (1) Effective informs and reporting of disease information had raised public awareness of wearing mask. (2) Shortage of masks and reuse exist in the implementation process. (3) The shortage of masks will be dealt by distribution in unified way and increasing production.

Conclusions: This study documented non-medical staff perceptions and experiences using mask before the outbreak and this epidemic period. Participants felt that the most effective approach to solve the problem of mask shortage in China is combine prevention infection measures, uniform distribution of masks, material reserve in public health system.

1. Background

In January 2020, COVID-19 became outbreak in Wuhan, Hubei Province China. Despite rigorous global containment, the incidence of COVID-19 continues to rise[1],and poses a major public health threat to many countries[2, 3], which included Singapore, France, Thailand, and South Korea.COVID-19 was transmitted from human to human[4] .The incubation period is up to 2 to 14 days[5] ,an increasing evidence suggest that may be occurring during the asymptomatic incubation period, which is challenge to the containment of COVID-19.Asymptomatic individuals can through close interpersonal contacts or from one city to another city in the world of travel to spread the disease. Although treatment for COVID-19 is various oxygen cure, symptomatic treatment, and immunomodulatory therapy [6, 7], there is no specific treatment. Given the many unknowns surrounding the COVID-19, prevention is particularly importance in controlling the global spread of COVID-19.

China as the first outbreak country has taken preventive measures including that all close contacts in isolation and stay at home out less as far as possible, health authorities advised people to wear masks, handwash and not subtract in personnel intensive place because of the COVID-19 can be spread by respiratory droplets and close contact. The prevention and containment measures of COVID-19 in China are effective. At present, people all over the world are working together to fight against the COVID-19, however, many countries have not realized the importance of wearing masks as preventive measure, China providing the experience in prevention measures may be beneficial to other countries. We suggest that everyone should wear mask. The virus can survive in the air, therefore healthy person will be infected.COVID-19 is possible to spread by aerosol when exposed to high concentrations of aerosol for a long time in a relatively closed environment, therefore personal protective measures are particularly

important ,especially wear mask. As infection prevention measure, clinical importance and effectiveness of masks are documented in the public health [8, 9]. The predictors of people using masks included perceiving susceptibility, severity of life-threatening diseases, and benefits of using masks [10, 11]. Masks are used in medical or non-medical[12, 13], and the purpose of using masks is different between before and after the outbreak. Medical workers and patients wear masks that may represent disease and associated with the disease. Since residents began wearing masks because of the fog haze in serious air pollution cities such as Beijing, we consider that masks could prevent air pollution and affect people's psychology, behavior, emotion expression [14]. Diverse research have been undertaken to find ways of controlling and reducing infections caused by COVID-19,however,some people even don't know anything about masks. As we all know, going out and communicating with people is a notable social behavior, Before the outbreak, communities, education and careers age determine that wear mask or not , and during the outbreak of COVID-19, the change of using mask posses social meaning. Wearing mask as social behavior is responsible for our health. Understanding the social significance of this behavior is conducive to the implementation of public health decision-making, the effective implementation of infection prevention measures and the construction of healthy communities. In the context of this study, some people do not wear mask may be affected by their poor knowledge of mask, ignorance of the benefits of mask, and the difficulty in purchasing masks. The findings of this study ban provide insights on how to enable non-medical staff to wear mask, so as to provide directions for the prevention of infection and health protection.

2. Methods

2.1. Setting and study subjects

This study adopts qualitative research methods[15] including individual, in-depth semi-structured interviews. Through purposive sampling [16], we recruit 24 non-medical staff as potential participants from various backgrounds to reflect a diversity of viewpoints, rather than population-based statistically representative samples. And conduct interviewees, during the peak season of COVID-19 since February to March in 2020.

2.2. Data collection

Informed consent was obtained from all interviewees before conducting. The ethical and informed consent interview guidelines are used to guide the interviews to ensure that does not deviate from the research issues. In order to maintain consistency and ensure the quality of interviews, all interviewees are conducted in their mother tongue to ensure that participants' views can be freely expressed. The interviews were recorded with the consent of the participants. Each visit lasts from 30 minutes to 60 minutes.

A phenomenological approach was adopted for data analysis. The interview questions are as follows:

1. Did you ever use mask before outbreak of COVID-19? Why did you wear mask?
2. Were there any symptoms during the outbreak of COVID-19?
3. Did you ever wear mask during outbreak of COVID-19? Why are you wearing mask? Where? If not, why?
4. What do you think of mask and people who used mask before outbreak of COVID-19?
5. What do you think of the mask now?
6. What do you think of people who use or not use mask during the outbreak of COVID-19?
7. Will you continue to wear mask after outbreak of COVID-19? Why?
8. How do you wear mask? How do you dispose of discarded masks?
9. What are your difficulties in using and purchasing mask in current? How do you to solve the problem?
10. Could you share your life stories, experiences and feelings during the outbreak of COVID-19?

2.3. Statistical analysis

Major themes in the data were identified by involved segmenting the interview records, collapsing them into categories, and identify themes through a process that involves abstraction and constant comparison. A coding table was developed that determined themes, categories, and codes with supporting evidence from interview records. Repeated codes and themes were noted and highlighted. The new topic codes generated from the data is added to the encoding table. The analysis program, coding, and findings are recorded in the codebook to ensure consistency and accuracy of the analysis data.

The three themes list the sub-themes under the three key topics and provide references. The three key themes based on the interviewers' experience and understanding of the mask as following in results. Each of which shows the differences between users and non-users before the outbreak of COVID-19, and the common during and after the epidemic, the data was compared summarized and analyzed until reached data saturation.

3. Results

Result included in present study, of which is 12 people wear mask while 12 were non-users, with ages ranging from 13 to 65, 19 were married and 5 were single. Educational level from junior high school to doctor. All interviewees are non-medical staff, but major in different works, they all use masks during the outbreak of COVID-19. Most of them had no disease but suffer from hypertension and asthma respectively (Table 1).

Table 1 Characteristic of interviewee

	NO	Age	Gender	Marrial status	Occupation	Educational level	Disease	symptom
USER(A group)	A1	60	M	M	Poultry keeper	senior high school	N	N
	A2	48	F	M	Seafood handler	primary school	N	N
	A3	47	M	M	catering worker	primary school	N	N
	A4	40	F	M	sales	senior high school	N	N
	A5	35	M	M	lirbrary worker-++	bachelor	N	N
	A6	27	F	M	Maternal and infant specialist	bachelor	rhinitis	N
	A7	35	F	S	food inspection worker	bachelor	N	N
	A8	25	M	S	company employee	bachelor	N	N
	A9	26	F	S	company employee	bachelor	N	N
	A10	18	M	S	student	senior high school	asthma	N
	A11	28	M	S	engineering technician	bachelor	N	N
	A12	35	F	M	student	PhD	N	N
NO-USER(B group)	B1	13	M	S	student	junior high school	N	N
	B2	22	F	S	student	bachelor	N	N
	B3	33	M	M	company employee	master	N	N
	B4	35	F	M	sales	bachelor	N	N
	B5	37	M	M	sales	bachelor	N	N
	B6	37	F	M	banker	bachelor	N	N
	B7	42	M	M	company employee	bachelor	N	N
	B8	49	F	M	civil servant	bachelor	N	N
	B9	51	F	M	company manager	bachelor	hypertension	N
	B10	50	M	M	freelancer	bachelor	N	N
	B11	51	F	M	teacher	bachelor	N	N
	B12	65	M	M	builder	senior high school	N	N

3.1. Effective informs and reporting of disease information has raised public awareness of wearing mask

In the group of using masks, they deem that masks can prevent the spread of influenza virus and protect them from respiratory diseases, anti-airpolution. It is particularly necessary to wear masks when suffer from respiratory disease.

3.1.1. Before the epidemic

People were lack of public health awareness and vigilance. Patients who wear masks described why they used mask before the outbreak and believed that mask was used to protect against air-pollution, sun and cold. Someone use it to avoid infecting people around them. In the other group“non-wear mask”, people

consider that they had not necessary to wear masks or were not aware of the existence of mask which may be daily necessities, so much so that people who wear mask may be sick.

It is not useful; I don't have the consciousness of wear mask. (B9-B10)

When the flu is going around and I'm afraid of infecting people around. (A4)

3.1.2. During the outbreak

Both the mask users and the non-mask users had no special opinion about the mask wearers, did not consider it was impolite, and both felt that the mask wearers were likely to be sick, but the difference between them was whether they took measures after sensing the danger of disease. Only one person in the non-mask group (B2) did not know that mask could prevent virus and bacteria. Through popular media and government's call, family education, most people aware of the risk and wear masks during the outbreak. No matter whether they used or not before the epidemic period, they were all began wearing masks.

For respond to national call and prevent infection, we wear mask in public and outdoors. (B4, B6)

Self-prophylaxis and other prophylaxis are for prevention of droplet transmission of COVID-19. (A5, A10)

The media did not report and no infection cases in our cities in the early stage of the epidemic, and then we would not wear. I think the media reports were very important for us to wear masks. (B3)

The reason for the interviewees in the non-mask group started wearing masks as following: A. The mass media reported that COVID-19 could be transmitted from person to person. Professor Zhong Nanshan mentioned that 13 medical workers were infected because of highly contagious, suggested that personal protective measures such as "wearing masks, washing hands frequently and not going to crowded places" should be taken. B. The disease is during the outbreak period, daily news reports indicate that the number of infections had increased significantly; many families are infected by one family member. C. When they go out, they are afraid of meeting potential infected people or were infecting, Wearing mask is a way to protect themselves. D. Now the outbreak is under control, the sticking point is removed, so some people are relax and begin to put off masks, which need to be paid attention.

Obedience is high when imported cases in the city and now most people are beginning to relax, and some people are not wear mask without masks. (B8)

3.1.3. After the epidemic

After the end of the epidemic, people would continue to use masks in crowded areas and public, or when they were sick, only two people indicated that they would not continue to use them as long as the

epidemic over.

I do not wear mask after the outbreak, I think it is unnecessary. (B5, B7)

3.2. Shortage of mask and reuse exist in the implementation process.

Problems also exist in the implementation process, although most people strictly enforced the prevention measures because of using mask during outbreak. The shortage of mask lies in the large population of China, masks belong to the disposable medical consumables, and government expropriated masks for the most support epidemic areas and hospitals.

3.2.1. Masks shortage

Most people cannot get mask from pharmacy till now, and then, purchase from agency or network by high price. Only one interviewee has adequate masks perfectly.

1.4 billion people in China, everyone has to use, and most mask are used in hospital, production masks during Spring Festival is decrease, some people stock up. (A4)

I felt that COVID-19 is threatening before the Spring Festival, so I bought 100 masks from the pharmacy in advance for spare. (B5)

3.2.2. Masks reused

Because insufficient in mask shortage, people had to reuse masks. The mask is serious possibility contamination pollution. Even if disinfection of mask is unknown, the method is used such as alcohol, ultraviolet light, ventilated place with sun drying. In our interviewees, most of them put the mask in ventilated place, only one person never repeated using mask while another man questioned the effect of disinfection and tried not to reuse.

I go outside and use one mask at a time originally, now no matter how many times a day I go out, I only use one mask, The maximum time is up to three days. [A5]

Go outside and use one mask at a time, but the mask is not enough, I reduce the frequency of going out, Change a mask four to five days. (B12)

In order to reduce the use of masks, my family members do not go out except me. [B4]

3.2.3. Masks discarded

Among our interviewees, there were four in twenty-four discarded the mask into special trash cans and only one sterilize the mask while some villagers threw mask into their own trash cans masks have not been treated, As we know, masks belong to the pollution supplies during outbreak of COVID-19.

I do a bundle under normal circumstances. The inner package outer fold, and then with a bag, and drop into the special bins (B3)

I will throw into the trash can at home. (B12)

3.3. The shortage of mask will be dealt by distribution in unified way.

3.3.1. Chinese government takes active measures to improve the supply of masks.

There are a few channels to solve this problem, such as pharmacy reservation mode, online shopping time set limit to snap up, expensive respirator from TaoBao sellers which masks source is unknown and no certificate. Someone bought flasks from abroad. In our interviewees, only one person has enough masks, but also deems that purchase is difficult. Everyone was worried about the quality of mask. Fortunately, there is one person from pharmacy appointments were draw, but the probability is very low and accident. Someone without mask entirely is likely to be no opportunity from pharmacy appointment. Everyone can reasonably understand that why mask is shortage and try to reduce go out to decrease the chance of using mask. The interviewees hope that mask is enough because of increasing production when return to work. The problem could be dealt through the following measures to extend to everyone who needs, Firstly, The government unified procurement of masks and distribution by community or village population. In the next, government unified procurement, unified distribution to medical institutions such as community health service center or pharmacy. According to the family unit or by the ID card. Thirdly but not the last, government assist the production company of masks by tax relief or economic support.

Companies such as Guangzhou Automobile Group started to produce masks; government should support masks producing enterprises. (A10)

I made an appointment from the pharmacy and drew lots for five. (A4)

I bought mask from purchasing agency and TaoBao sellers, but security of mask cannot be guaranteed, the best way is distributed by government or pharmacy ,the id card will be used to receive.(B8)

If the government put masks unified procurement, or pharmacies store enough masks, we all know register to receive every day, then the masses will not panic stockpiling which cause people catch mask of high price.

4. Discussion

Among our interviewees, personal prevention and protective measures such as wearing masks, handwash frequently and staying away from crowded places were adopted. All people understand when and how could they wear mask and deal with abandoned masks through popular media and government's call. Many communities set special trash can recycle and concentration processing during the outbreak of COVID-19. Even if COVID-19 is under control, the interviewees will continue to wear mask in public from some time to time.

Risk perception is effective. Researchers have stayed that the practice of preventive behaviors by individuals is one of the most effective ways in disease prevention and health promotion [17, 18], and this study also. The people we interviewed had perceived the risk of the COVID-19 and kept an eye on disease progression, therefore taken better measures to prevent infection such as buy masks in advance, do well in family education, especially for the elderly and children. Study suggest that household transmission of influenza can be reduced by the use of preventive measures such as masks and intensified hand hygiene, when implemented early and used diligently[9, 19]. Contributed to the elderly patients are prone to complications[6], children are also infected[20], and received less information about diseases, all of these need to be considered. Family education is essential for compliance with preventive measures. Use of personal protective equipment to protect against respiratory infections is remarkably effective.

Risk perception is the participants 'belief about the risk level of their infection or transmission of disease[15]. The possibility of adopting protective behavior will be increase with the increasing of risk perception. In this study, the compliance of participants is their reasons for complying with or not following the mask advice. Interviewees' compliance is affected by personal factors such as environmental organizational, their own health evaluation, occupation, education level and the feeling of using the masks; environmental factors include the actual situation of the epidemic, the infection in the city, the popularity and awareness of preventive measures among the people around them; The call of superior units and government agencies are organizational factors. Study has showed that environmental cues to wear masks are very important[21]. Users' understanding of the disease comes from television, Internet, and professional interviews including seriousness of the disease and implement preventive measures. In the early stage of COVID-19. Interviewees wear masks carefully when going out and did not take the masks off easily. ven if they feel uncomfortable in our study. They reduced going out because of mask shortage. In all, Risk perception influenced preventive behavior which predicted effectiveness of preventive measures related to the number of reported cases, severity of community problems, also related to the practice of prevention, but panic buying of risk perception may leads to rush to purchase which is also a factor of mask shortage.

As the pandemic has developed, fact has become apparent that there is a serious shortage of emergency medical supplies, especially personal protective equipment. With explanation for the shortage of masks as following: a population of 1.4 billion in China, emergency situation of outbreak, government commandeered masks for the worst-hit areas and the lack of production capacity during the Spring Festival. During the epidemic, except a few people in advance to buy masks in the regular Pharmacy while others worried about the quality and effectiveness of masks from TaoBao. Lack of masks leads to the reuse. Considering the efficacy of different methods of disinfection is not clear, hence prevention of disease can't be ensured. There is no evidence that mask can be reused because of the virus and bacteria can remain for a period of time on the mask, so much as cause infection when you touch the mask with your hand.

If the government could unify the purchase and distribution of masks or all the pharmacies store masks, everyone register to get mask every day, then the public will not panic stock. Discrimination and prejudice caused by fear or misinformation have flow around the globe, superseding evidence and jeopardizing the efforts of COVID-19[22].hence verified information is the most effective prevention against the disease of panic[23]. Demand exceeds supply lead to the high price of masks. Everyone can equally use masks and don't worry about the shortage of masks and high price, which is conducive to the implementation of preventive measures, and the rational allocation of resources.

COVID-19 continued to affect both health care workers as well as individuals from the community. 80958 infected cases and about 3162 deaths cases until March 11, 2020. How can we reduce the possibility of infection? Hopes focus on drug anti-COVID-19, especially vaccines[24], but the WHO estimates it will take 18 months for the COVID-19 vaccines to be available. Isolating, Wash hands and wear masks which have been shown to be effective in preventing disease must be taken, no matter how prevalent the COVID-19 is. Popularize the knowledge of respiratory diseases and knowledge of cross-infection, extend the prevention of diseases such as respiratory and digestive tract. Everyone is required to have refresher infection-control training to make a good knowledge reserve of epidemic diseases. And it is useful to set poster reminders on handwash, wear mask and sterilize in the workplace.

Enlightenment to China's public health system is infection prevention measures of knowledge popularization, whether it is respiratory disease transmitted or digestive, even other infectious diseases, such as the following to perfect our system of public health: (1).Mass media propaganda, even negative teaching materials; (2). Transparent and detailed outbreak information is useful. The interviewees mentioned that they did not know the seriousness of the epidemic before the outbreak.Now they are afraid that the information of the epidemic is not completely reported and continue to wear masks in case of infected people. During this uncertainty period, there may be no way to destroy COVID-19 pandemic in this globalised time, but verified information is the most effective prevention against the disease of panic[23]; (3). Understand the severity of the disease through timely news reports, and focus on the epidemic trend. Real-time dissemination of scientific information could fight public health emergency of international concern[25]; (4).Universal education of public healthy may focus on students and the elderly in community construction supervise and control the droplets spit habits, when necessary

to punish. Family as unit in the community, one of the family members as representative to learn about disease prevention knowledge teaches other members, especially the elderly and children. The influence of the younger behavior is crucial to family.

5. Conclusion

This study documented non-medical staff 'perceptions and experiences using mask before the outbreak and during epidemic period. It is important to combine prevention infection measures, uniform distribution of masks, and material reserve in public health system.

6. Limitation

The children and elderly were not included in this study, but the elderly with COVID-19 tend to develop into severe cases, we cannot understand the thoughts of these two groups. The views and problems of using masks in children exist, which need to be paid attention to in the future. Especially cases of COVID-19 have been reported in children and newborn.

Although 24 interviewees included in this study, which could not include all people with different backgrounds, such as region, country race and religion.

7. List Of Abbreviations

Coronavirus Disease 2019 - COVID-19

8. Declarations

Ethics approval and consent to participate:The study has approved by the Human Research Ethics Committee Faculty Research in the First Affiliated Hospital of Shantou University Medical College. Written informed consent was obtained from individual or guardian participants.

Consent for publication:Not applicable.

Availability of data and materials:The datasets analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that do not have any commercial or associative interest that represents a conflict of interest.

Funding: Not applicable

Authors' contributions: YM contributed to the conception of study and design, and writing the manuscript. LL participated in the conception of the study and design, data collection and analysis. DW involved in the study design and data collection and analysis. XD participated in data collection and analysis. HC

participated in the data collection and analysis. ZS and YM supervised the study implementation and identified the key themes, and critically revised the manuscript. All authors read and approved the final manuscript.

Acknowledgements: We thank all the interviewees who shared their time and perspectives.

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