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Nurses' health beliefs about paper face masks in Japan, Australia, and China:  
a qualitative descriptive study

**Abstract**

**Aim:** To explore the health beliefs of clinical and academic nurses from Japan, Australia, and China regarding wearing paper masks to protect themselves and others and to identify differences in participants' health beliefs regarding masks.

**Background:** The correct use of face masks and consensus among health professionals across the globe is essential for containing pandemics, and nurses need to act according to policy to protect themselves, educate the public, and preserve resources for frontline health workers.

Paper masks are worn by health professionals and the general public to avoid the transmission of respiratory infections, such as COVID-19, but there appear to be differences in health beliefs of nurses within and between countries.

**Methods:** This qualitative descriptive study used content analysis with a framework approach.

**Findings:** There were major differences in nurse participants' beliefs between and within countries, including how nurses use paper masks and their understanding of their efficacy. In addition, there were cultural differences in the way that nurses use masks in their daily lives and nursing practice contexts.

**Conclusion:** Nurses from different working environments, countries, and areas of practice hold a variety of health beliefs about mask wearing at the personal and professional level.

**Implications for Nursing Policy and/or Health Policy:** The COVID-19 pandemic has sparked much discussion about the critical importance of masks for the safety of health professionals, and there has been considerable discussion and disagreement about health policies regarding mask use by the general public. Improper use of masks may have a role in creating mask shortages or transmitting infections. An evidence-based global policy on mask use for respiratory illnesses for health

professionals, including nurses, and the general public needs to be adopted and supported by a wide-reaching education campaign.

**Keywords:** COVID-19, culture, health belief, infection control, mask, nurses, policy, respiratory disease.

## Introduction

In the context of the Coronavirus Disease 2019 (COVID-19) pandemic, a Minister of Health in an Asian country criticised Western visitors for not accepting face masks when he was distributing them to tourists to tackle the threat against novel coronavirus (Ng 2020) and in China people without masks in public were scolded and humiliated on social media (Yu et al. 2020). In contrast, in Europe, Asian people wearing masks were told to remove them because they frightened people (Uematsu 2020), and in the USA, masks have become a political issue with mandates to wear face masks in public seen as an affront to freedom (Rojas 2020). These anecdotes perhaps attest to differences in health beliefs between the East and West. Nurses across the world are in a critical position to guide the general public in infection control and health practices that are consistent with the evidence but may themselves unknowingly be more influenced by culture than evidence.

There has been considerable debate and some disagreement on directives and policy about mask use by the general public during the COVID 19 pandemic at a political level. Paper face masks are worn both to prevent the spread of respiratory disease and to avoid contracting a disease. However, the efficacy of face masks for preventing transmission of influenza is as yet to be determined and the available evidence is contested (Secon 2020). Masks were found to be ineffective in avoiding the development of cold symptoms (Jacobs et al. 2009).

This qualitative descriptive study will present nurses' perspectives of mask wearing from a multinational study of clinical and academic nurses in Japan, Australia, and China.

## Background

There are two main face masks used in clinical settings: surgical masks and N95 masks. N95 masks are designed to block at least 95% of small particles, have a very close fit and the filtration capability exceed that of a surgical mask, but breathing can be difficult (US Food and Drug Administration 2020), and masks cannot be used by people with facial hair (Desai et al. 2020). N95 masks are not the subject of this paper. Surgical masks, which are the main topic of this research, were designed to be used by surgeons to prevent saliva from contaminating a surgical field and may be effective in blocking splashes and large-particle droplets, but do not filter or block viral particles potentially transmitted by coughs and sneezes. The loose fit also means that they do not provide complete protection (US Food and Drug Administration, 2020).

## Literature Review

It is imperative that nurses and health workers use appropriate personal protective equipment when required, but the inappropriate use of facemasks during the COVID-19 pandemic has contributed to shortages for frontline medical workers whose need is the greatest (Boseley 2020). Shortages of personal protective equipment also led to health worker deaths in previous epidemics, including the Ebola outbreak in West Africa (Hewlett & Hewlett, 2005).

Healthcare workers have died in China, Spain, the UK, and Italy and had to resort to homemade personal protective equipment (PPE), wear ill-fitting masks, or reuse masks (Neale 2020). Controversially, in response to shortages, the CDC has mooted the reuse of facemasks and wearing of homemade masks by healthcare workers in severe shortages (CDC 2020a), while WHO (2020) remains firm in that masks should not be reused and cloth masks are not recommended. A systematic review of respiratory personal protective equipment for *clinical* settings supported the use of medical masks but concluded that disposable, paper, or cotton masks were ineffective and potentially might transmit pathogens if used more than once and not sterilized (Offeddu et al. 2017).

Surgical masks may not effectively limit the transmission of influenza in the community and may be insufficient for COVID-19 (Chang et al. 2020), although some studies suggest they may have some effect (Brienen et al. 2010; MacIntyre et al. 2009). There is limited evidence supporting the use of masks to prevent infections in community settings, although it may reduce transmission in conjunction with hand hygiene and other infection control measures (Wong et al. 2014). Differences in outcomes may be because measuring adherence to mask use is problematic, and studies such as Yang et al. (2011) rely on self-report and do not measure whether mask use was appropriate. Barratt et al. (2019) set out a convincing case for further research into a health care worker's decision-making concerning the use of face masks for protection against respiratory diseases.

Attitudes and local or organizational policies regarding the wearing of masks use vary between countries, in particular the wearing of masks outside clinical settings. References to people from Asia wearing masks appeared in the medical literature as far back as 1973, and in the 13<sup>th</sup> century China, servants would wear a silk cloth over their face when serving food to the emperor (Jacobs et al. 2009). In Asia, face masks are often worn during the influenza season to avoid respiratory infections: a Hong Kong study reported that close to 90% of participants wore face masks when they had influenza-like illnesses, and 21.5% reported regularly wearing face masks in public (Lau et al. 2010). Others wear masks to protect against particulate air pollution and seasonal allergies, although ill-fitting and poorly designed masks and the movement of wearers can limit their effectiveness (Cherrie et al. 2018).

Hong Kong researchers surveyed older people living in the community to explore their beliefs about wearing facemasks to prevent influenza during a pandemic and found that a range of opinions (Zhang et al. 2019). Some said that wearing masks was a social responsibility; seeing others wearing masks triggered similar behavior; others believed that wearing masks was only for those who were ill and others that wearing masks was inconvenient and made it hard to breathe (Zhang et al. 2019). In short, participants appeared to rely more on their own experience and anecdotal sources to inform their decisions than on evidence-based knowledge.

Surgical masks are commonly and widely worn in East Asian countries during flu season and in their daily lives. They have been described as a “social firewall” (Yang

2014). Japanese women have also reported wearing masks to avoid getting a suntan to appear more western; to cover their faces when they had not applied make-up; to keep warm or hide a red nose, make their face look smaller, or to give themselves a 'mysterious' appearance (Leung 2020). In Japan it is also seen as good manners to wear a mask representing thoughtfulness to others when one is ill, and companies may have policies mandating mask use (Nakamura 2020). By way of contrast in most Western countries, people are discouraged by medical authorities from wearing masks, and the public is urged to save precious supplies for clinicians, but the advice from experts in Asian countries differs (Leung 2020).

Nurses' health beliefs and behaviours affect their patients and students, and our previous research (Stone & Conway, 2018) has shown that nurses might hold incorrect, culturally determined, and non-evidenced health beliefs which they pass on to patients and students. There is no research into the beliefs of nurses regarding mask use or whether differences exist between countries in these beliefs.

### **Aims of study**

To explore the health beliefs of clinical and academic nurses from Japan, Australia, and China regarding wearing paper masks to protect themselves and protect others and to identify differences in participants' health beliefs regarding masks.

## **METHODS**

### **Research Design**

This is a qualitative descriptive study using content analysis on nurses' responses in Japan, Australia, and China to two items related to paper masks to: 1) protect oneself from infection; and/or 2) protect others from infection. This research forms a secondary analysis from a more extensive multinational Q methodology study of clinical and academic nurses in China, Thailand, Australia, Japan, and Korea; the methodology has been described previously (Cao et al. 2017) which study plan was reviewed and approved by Japanese Grant in Aid. Q-methodology uses both quantitative and qualitative analysis.

## **Sample and setting**

A sample of 176 nurses were recruited in this study across three countries using convenience sampling: 27 clinical nurses and 33 academics from Japan; 28 clinical nurses and 28 academics from Australia; and 31 clinical nurses and 29 academics from China. Recruitment was via email to site coordinators in hospitals and community health settings and university Heads of School and participation solicited via posters. In Japan and China, samples were taken in four geographical sites and Australia across one large health district in one state. Nurses were drawn from a variety of clinical and academic backgrounds, including infection control, hospital and community nursing, mental health, and medical and surgical nursing. The inclusion criteria were registered nurses, with at least one year's clinical experience, born and raised in the country where the study was conducted.

## **Data collection**

Data was drawn from a secondary analysis of a Q methodology study conducted in Japan, Australia and China between 2015 – 2017 about nurses' health beliefs about. In this study we analyse responses to two items: "wearing a paper mask will protect oneself from infection" and "wearing a paper mask will protect others from infection." These health belief questions guided interviews with nurses and were audio-recorded, transcribed, and translated into English.

## **Data analysis and reporting**

Content analysis was conducted by the researcher's questions arising from the purpose of the research and recurring participants' views (Pope et al. 2000). We used predetermined (á priori) categories to seek out not only the patterns and trends in the data but also their frequency as is being encouraged by more recent theorists (Bryman 2016; Liamputtong 2017). Data were analysed by the first author and was checked by the second author. QSR International's NVivo 12 software was used to manage the data. This study was reported according to the consolidated criteria for reporting qualitative research (COREQ) checklist.

## **Rigor and Trustworthiness**

The research team in this phase was a group of PhD prepared nurse academics in Japan, Australia, and China. The researchers included two professors with long experience of working in China and Japan and expertise in qualitative research. Participant quotes are extensively presented in the tables but, because this was a secondary analysis of data, participants did not have the opportunity to check their comments. Permission to use the data for future analysis was given in the consent form of the main study. Reflexive journals were kept to create a decision trail.

## **Ethical Approval**

Approval was obtained from the research ethics committees of the Faculty of Health Sciences, Yamaguchi University Japan, HOPE School of Nursing, Wuhan University, Hubei, China; and The University of Newcastle, NSW, Australia.

## **FINDINGS**

### **Demographics**

The great majority of participants in Japan, Australia and China were female 85% (n=51); 82% (46) 97% (n=58) respectively [Appendix 1]. The mean age of Japanese participants was 41 (SD = 11.2), and 63% had a bachelor's degree or higher degree. In China, the mean age was 36 (SD = 7.3), and 52% had a bachelor's degree or above. Australian nurses were older with a mean age of 48 (SD 10.4), with 84% had a bachelor's degree and above.

### **Factors influencing effectiveness**

In answer to questions about whether wearing a paper mask will protect others and/or oneself from a respiratory infection the responses of participant nurses across the three countries varied, and they used phrases such as "to a degree." However,



Australian and Japanese participants had opposing views. More Australian participants said that they did not believe masks protected others or themselves, while more Japanese participants believed that they did. Chinese participants, like their Australian counterparts, tended to disagree that masks protected either others or themselves.

Many participants whose answers were in a middle ground between whether masks were effective or not, added their reasons using a phrase such as, it 'depends on'. A quarter of nurses across the three countries stated that size of pathogens; mode of transmission; and/or type of respiratory infection determined the protective efficacy of masks. However, there was a substantial inconsistency between respondents in what size of pathogens and mode of transmissions the mask was intended to protect against. Factors that influence nurse participants' beliefs about the effectiveness of wearing masks are presented in Table 1.

[Please insert Table 1 around here.]

#### *The size of pathogens/mode of transmission/type of diseases*

Several respondents cited factors that they believed influenced whether masks protect others and/or oneself from a respiratory infection. Most commonly noted by participant nurses across all three countries were the size of pathogens, mode of disease transmission, and type of disease. However, there were substantial discrepancies between respondents in their understanding of what masks protect from in relation to airborne diseases, droplet, or aerosol transmission. Many Chinese participants stated that masks protect against airborne transmission, while their Japanese and Australian counterparts stated they protect against droplet spread, for example, an Australian academic affirmed: "Paper masks certainly limit transmission of viruses from droplets."

#### *The quality/type of masks*

A quarter of the respondents said that the protection of self or others from respiratory infections depended on the type of mask with Australian participants the most concerned about this. Some Japanese participants referred to N95-rated face masks and their superiority over general paper masks. Others, including many Australians, also mentioned factors such as whether masks were accredited, professional, the duckbill type, or whether they were used in hospitals or the community. Some Chinese nurses and a Japanese nurse stated that cotton masks might work.

### *Duration of wearing masks*

Several Australian participants and a few Chinese participants stated that paper masks are effective for only a short while. However, there was a range of opinions about the duration of effectiveness ranging from 30 seconds to four hours. None of the Japanese nurses mentioned that masks should be changed frequently; instead, some stated that they wear masks to prevent respiratory tracts from dryness.

### *Management of masks*

Participants from Australia and Japan stated that it is vital to wear paper masks correctly for them to be effective. Josh, an Australian academic, voiced his concern: "If you're not wearing it [a mask] effectively, it's obviously going to be less effective."

Participant nurses from all three countries stated that masks form a part of a suite of infection control measures along with hand hygiene: some Australian clinicians referred to gloves, hand sanitizers and cough etiquette. A Chinese academic stated, "wearing a paper mask is one way, but it cannot be totally prevented. Handwashing is also important...". Japanese participants also mentioned gargling as being an essential part of infection control.

## **Reasons and sources of beliefs**

### *Evidence or Experience/Anecdotal*

Participant nurses were asked the source of their beliefs about masks. Most commonly cited were policies and guidelines; however, Chinese participants did not mention these. The third source of beliefs was illustrated by anecdotes primarily from Asian nurses: some stated that there was no evidence or admitted that they had not examined it; others that they learned about masks at school or work. Only Japanese participants stated they had learned from television. Nurse participants' reasons for and sources of beliefs are presented in Table 2.

[Please insert Table 2 around here]

### *Culture*

Participating nurses showed a high level of awareness about the influence of culture on wearing masks. Australians stated that wearing masks in public places was related to Asian culture, citing the source as images on the media and their observation of Asian people. Japanese participants themselves thought that mask wearing was a Japanese custom, although wearing paper masks has become common in other Asian countries in recent years due to air pollution.

### *Morals or rules and psychological influences*

Asked about their reasons for wearing a mask to protect other people, Japanese participants cited societal rules as the reason for masks and Australian counterparts were more likely to cite ethical or moral reasons. Some Japanese and Chinese participants stated that there are psychological aspects to the wearing of masks.

## **DISCUSSION**

We explored the health beliefs of participating clinical nurses and nurse academics in Japan, China, and Australia regarding the efficacy of wearing paper masks. This is the first transnational study to look at nurses' beliefs in relation to the wearing of face

masks, and we found, as Barratt et al. (2019, p.171) hypothesised, that constructs and perceptions around the wearing of masks were markedly heterogeneous. Our results reflect the mostly anecdotal evidence that there are sharply divided views about the efficacy of mask wearing between Western and Asian nurses. Overall, Australian participants believed that paper masks do not protect the self or others, but many Japanese participants expressed the opposite view. However, there was also disagreement among participant nurses from the same country, which indicates inconsistency and confusion about the efficacy of paper masks that perhaps reflects conflicting research results about mask efficacy and a lack of clear policy direction. This is of great concern when we need to have a coordinated international response to pandemics of respiratory disease.

### **Factors influencing effectiveness**

There was some consensus among participant nurses across three countries that the types of masks or quality of the paper were the chief mediator of effectiveness. These factors have a basis in research: disposable surgical masks are used to prevent the transmission of microorganisms from wearers to others by blocking large droplets (US Food and Drug Administration 2020) whereas N95 masks are used to protect clinicians from inhaling small airborne particles (Radonovich et al. 2019).

In Asian countries such as Japan, washable fabric masks are commonly used in public. The Japanese government has recently distributed fabric masks to every household to secure the supply of surgical masks for patients and healthcare professionals (Japan Ministry of Economy, Trade and Industry 2020), and in the USA, the CDC is advocating washable fabric masks for similar reasons.

Participants' concerns about poor management of masks seem to be in accord with the mask guidelines, which often include the phrase: "if worn properly." The effectiveness of masks for preventing infection is dependent on proper fitting, appropriate use, and adherence to infection control guidelines (WHO 2020).

Considering masks as a part of infection control is supported as Grade A evidence in Best Practice Recommendations: "Face mask use is best undertaken as part of a package of personal protection, especially including hand hygiene in both home and

healthcare settings” (Podder 2019 p. 2). The WHO (2020) stipulates that masks should be used in combination with hand hygiene and other infection prevention and control measures.

Japanese nurse participants regarded gargling as part of the suite of infection control measures. Gargling has been shown to kill a range of microbes, and it is mentioned as part of the recommended preventive measures in the Japanese government's pandemic plan (Inter-ministerial Avian Influenza Committee 2007), and recent British and German research has shown that gargling has a role in warding off some respiratory infections (Naito 2020; Ramalingam et al. 2019).

Japanese participants considered masks to be important in maintaining moisture in the nose and mouth to protect against respiratory infections. This is apparently in conflict with WHO (2020) guidelines stipulating that masks should be replaced when they get wet. There is some evidence suggesting that the retention of moisture can have positive benefits: moisture in respiratory passages is lost with exhalation in dry environments such as airplanes, which results in increased susceptibility to virus infection and aggravate respiratory diseases (Harvard Women's Health Watch 2008). Wearing masks may contribute to raising the in-mask temperature and thus warming respiratory tracts (Cherrie et al. 2019). Inhalation of dry air causes epithelial damage, and influenza viruses, including the coronavirus, likely remain active longer at low humidity and low temperatures but are less active in warm, humid air (Moriyama et al. 2020). However, in-mask humidity and temperature can be a cause of discomfort (CDC 2020b).

### **Reasons and sources of beliefs**

The most commonly cited source of beliefs among participants was the policies and guidelines of their institution. In the absence of evidence or when evidence was inconsistent, participants reported relying upon their experience or anecdotes from reliable people. Asian nurses tend to rely on their self-experience and anecdotes while their Australian counterparts referred to policies and guidelines.

There were intercultural differences in beliefs between Japanese, Australian, and Chinese nurses regarding masks, beliefs in Asian countries may be shaped by

concepts from Taoism, in which breath and breathing are important. In Japan, over US\$230, 000,000 is spent on facemasks annually (van Dorn 2017). Personal protective practices, including the wearing of masks, are socially and culturally accepted and are considered to reflect a high hygiene standard because people who wear masks have been found to be more likely to practice other hygiene measures such as hand washing (Wada et al. 2012).

Conversely, some Westerners may find it uncomfortable to see faces partially hidden with masks and may resist mandated mask-wearing (Wong, 2020), although this reason was not cited by any of the participants. Australian nurses reflected the conventional position that masks should not be worn by healthy people but are worn only by healthcare workers, those taking care of people with respiratory infections or those who have the symptoms of a respiratory infection (Desai et al. 2020). However, it is likely that mask-wearing norms across the world will be permanently changed as a result of the COVID 19 pandemic. As in Asia, some European countries and American states are mandating the use of masks by the general public (Javid 2020), and more and more people in public are wearing masks even in Western countries. Of note is that WHO stated in the latest guideline (2020) that masks should be used in accordance with local cultural habits in the absence of sufficient evidence of their usefulness.

## **Limitations**

Because our study involved the secondary analysis of qualitative data from a more extensive Q-methodology study, transcripts were not returned to participants for comment or correction; therefore, some caution is recommended when interpreting the results.

The large sample size across three countries was a positive aspect of this study and another strength of the research is that data were gathered before the COVID-19 pandemic and before the devastating Australian bushfires, which marked the beginning of 2020 and created hazardous levels of smoke across much of eastern Australia. Although deeply held beliefs generally change slowly, it is likely that these

events may profoundly affect nurses' views on the use of masks, and this study provides a useful point of reference for future studies.

## **Conclusion**

Masks have never been the focus of so much attention from all over the world. The findings demonstrate that nurses from different working environments, customs, and practice hold a variety of health beliefs about mask wearing despite all having access to central WHO and CDC policies and guidelines. A follow-up study to assess whether nurses' beliefs have been changed by the COVID 19 pandemic is warranted and whether these beliefs now align with current WHO guidelines. The range of beliefs about the wearing of paper masks for clinical and personal use suggests there is a need for consistent, evidence-based protocols to be emphasised in an awareness heightening campaign by WHO and CDC and within nursing professional organisations and national health systems.

## **Implications for Nursing Policy and Health Policy**

The COVID 19 pandemic has brought into sharp focus differences in thinking about the wearing of masks between and within countries has led to considerable confusion among the general public and nurses are in a good position to advise them in conjunction with evidence-based WHO and CDC policies and guidelines. Nurses themselves need to be aware of cultural bias in their beliefs about mask wearing and ensure that their practice and advice is based on evidence.

The correct use of masks and consensus between health professionals across the globe is essential for containing pandemics, but our research suggests there is little consensus or consistency about the efficacy and indications for wearing masks both within and between countries. The critical importance of protection for health workers has been evident by the tragically high numbers of deaths during the current COVID-19 pandemic.

The study results have global relevance to health care workers and preparedness for pandemics. International online education that is transcultural is needed to provide

nurses with relevant up to date evidence-based information so that they use personal protection appropriately and can educate the public so that they are prepared in the case of another pandemic. Additionally, there is a need to assess nurses' understanding and application of mask/handwashing procedures as a part of infection control and health services need to ensure adequate PPE supplies.



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