Practice and technique of using a protective mask in older adults

ORIGINAL ARTICLE

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ABSTRACT

Objective. To assess the practice and technique of using a protective mask (surgical mask) in older adults.

Methods: A convenience sample of 287 older adults aged ≥ 65 years were recruited between January and February 2017 when there was no respiratory epidemic. Their practice and technique of using a mask were assessed using a questionnaire and an observational checklist, respectively.

Results: Older adults' practice and technique of using a mask were unsatisfactory. 30.1% and 26.9% indicated that they never wear a mask when taking care of family members with fever and respiratory infection, respectively. None could correctly perform all 12 steps in wearing and taking off a mask. 92.3%, 96.6%, and 93.7% did not perform hand hygiene before wearing and taking off the mask and after disposing of the mask, respectively.

Conclusion: Compliance of older adults with wearing masks during a non-epidemic period was low. The commonly omitted steps of wearing and taking off a mask were related to hand hygiene. We recommend using the knowledge-attitude-practice model to rectify misconceptions and strengthen awareness on the use of masks in the required situations and on commonly omitted or incorrectly performed techniques.

Key words: Aged; Masks; Public health; Respiratory tract infections

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INTRODUCTION

Older adults generally are more susceptible to infections, especially those with weakened immune function or multiple comorbidities.¹ Respiratory tract infection is a major cause of death among older adults.² Preventive behaviour is effective in limiting the spread of infectious diseases.³ To protect older adults from respiratory infections, the use of masks such as surgical masks is recommended.⁴ A mask can block potentially infectious droplets. When used correctly, masks are effective in protecting oneself and preventing others from acquiring respiratory

infections.⁵⁻⁷ However, incorrect use may hinder its effectiveness.

Studies have reported high compliance of adults with wearing masks when visiting clinics or hospitals during influenza season or a pandemic to protect oneself (81.9%) and others (91.8%)⁵ and when having respiratory symptoms during respiratory epidemics (88.7% to 92.4%).^{8,9} During the COVID-19 pandemic, compliance with wearing masks is high in adults¹⁰ and older adults.¹¹ In Hong Kong, >90% of older adults use a mask frequently in public or in clinics.¹¹ However, it is less common to wear a mask

in many western countries.¹² The differences in public health policy and public interest may attribute to the discrepancy. Compliance with wearing masks during a non-epidemic period has not been investigated systematically.¹³ Compliance may be high because of a habit developed during the epidemic or may be low because of immediate behavioural change in the epidemic.¹⁴ Wearing and taking off a mask involves 12 steps,⁶ but 52% of outpatients and their caregivers correctly identify three steps only.⁵

Being female is reported to be a determinant of using a mask to protect against respiratory infections,^{4,8,15} but no gender difference is reported in other studies.^{16,17} This study aimed to assess the practice and technique of using a mask in older adults.

METHODS

This cross-sectional study was approved by the Research Ethics Committee of The Open University of Hong Kong (reference: 2016-06). A convenience sample of 287 older adults aged ≥ 65 years who had no allergy to masks and alcohol hand rub were recruited in public areas in Hong Kong between January and February 2017 when there was no respiratory epidemic.

Although a mask-use scale that assesses the practice of wearing a mask such as the location of use and whether the mask is used to protect oneself or others has been developed⁵ and validated¹⁸ in Hong Kong, the present study conceptualised the practice of wearing a mask in terms of required situations.⁶ Thus, we developed a new questionnaire based on the guidelines in *Use Mask Properly*.⁶ It comprises three statements of situations that require wearing a mask in a non-epidemic period, each was rated on a five-point Likert scale in terms of frequency from 1 (never), 2 (seldom), 3 (sometimes), 4 (often), to 5 (always). An option of 'not applicable' was provided. Responses to each required situation were analysed separately. This questionnaire demonstrated high content validity index (1.0) and test-retest reliability coefficient (0.83).¹⁹

The observational checklist comprises eight steps of wearing and four steps of taking off an earloop-type surgical mask. Each is rated as 0 (incorrect) or 1 (correct) by a single researcher. The total score ranges from 0 to 12; higher scores indicate a better

technique. This checklist demonstrated high content validity index (1.0) and high inter-rater agreement (kappa coefficient = 0.92).²⁰

Mann-Whitney *U* test was used to test sex differences in each situation. Independent *t*-test was used to test sex differences in the technique of wearing and taking off a mask. The level of statistical significance was 0.05.

RESULTS

287 older people (169 women and 118 men) aged 65 to 74 years ($n=145$) or 75 to 84 years ($n=142$) were included. Their practice and technique of using a mask was unsatisfactory. 30.1% and 26.9% indicated that they never wear a mask when taking care of family members with fever and respiratory infection, respectively (**TABLE 1**). Women wore a mask more frequently than men ($p<0.05$).

The mean score for technique was 5.3 ± 1.8 (range, 1-10). None could correctly perform all 12 steps in wearing and taking off a mask. 94.1% could position the elastic band properly and 87.1% could ensure that the part with the metallic strip is on the upper side. 92.3%, 96.6%, and 93.7% did not perform hand hygiene before wearing and taking off the mask and after disposing of the mask, respectively (**TABLE 2**).

DISCUSSION

In Hong Kong, compliance with wearing masks during respiratory epidemics is high (88.7%-92.4%).^{8,9,11,21} However, during a non-epidemic period, the compliance among older adults was low (27.8%-40.5%), which is consistent with 14.7% to 48.1% reported in a study.¹³ People are less likely to maintain high compliance during a non-epidemic period because their good performance in the epidemic is due to immediate behavioural change.¹⁴ The Health Belief Model states that perceived susceptibility is one of the variables determining the update of a health preventive behaviour.⁴ The previously established good practice in the population cannot be sustained.

People tend to assume that they know how to wear a mask.⁵ In the present study, older adults did not demonstrate proper technique of wearing and taking off a mask. The commonly omitted steps

TABLE 1
Practice of wearing masks among older adults (n=287)

Required situation	Always*	Often*	Sometimes*	Seldom*	Never*	Not applicable*
When taking care of family members with fever	70 (27.8)	32 (12.7)	34 (13.5)	40 (15.9)	76 (30.1)	35
When taking care of family members with respiratory infection	79 (31.2)	24 (9.5)	37 (14.6)	45 (17.8)	68 (26.9)	34
When having respiratory symptoms	113 (40.5)	37 (13.3)	36 (12.9)	54 (19.3)	39 (14.0)	8

* Data are presented as No. (%) of older adults

TABLE 2
Technique of wearing and taking off a mask among older adults (n=287)

Technique	Correct*	Incorrect*
Wearing a mask		
Perform hand hygiene before wearing the mask.	22 (2.7)	265 (92.3)
Choose the appropriate size of mask.	193 (67.2)	94 (32.8)
Ensure the colored side of the mask is facing outwards.	217 (75.6)	70 (24.4)
Ensure the part with metallic strip is on the upper side.	250 (87.1)	37 (12.9)
Position the elastic band properly.	270 (94.1)	17 (5.9)
Press firmly on the metallic strip to the bridge of nose and face.	106 (36.2)	183 (63.8)
Extend the mask to cover mouth, nose and chin.	216 (75.3)	71 (24.7)
Avoid touching the mask once it is secured.	98 (34.1)	189 (65.8)
Taking off a mask		
Perform hand hygiene before taking off the mask.	9 (3.1)	278 (96.6)
Touch only the elastic bands.	47 (16.4)	240 (83.6)
Dispose of the used mask in a lidded rubbish bin.	86 (30.0)	302 (70.0)
Perform hand hygiene after disposing the mask.	18 (6.3)	269 (93.7)

* Data are presented as No. (%) of older adults

were related to hand hygiene. These are essential to prevent acquiring respiratory pathogens through touch. Wearing a mask and performing hand hygiene together are recommended to prevent transmission of influenza in community settings.^{22,23} According to the knowledge-attitude-practice model, increasing knowledge and attitude influences change of practice.²⁴ It is suggested to rectify misconceptions and strengthen awareness on the use of masks in the required situations and on commonly omitted or incorrectly performed techniques.

There are limitations to the present study. Although direct observation is better than self-reporting in terms of assessing performance, it is impossible to eliminate the Hawthorne effect. Moreover, a question asks whether the subjects wear a mask when they are taking care of family members

with fever. Because some fever cases are non-infectious, the measurement might be overestimated. Further studies to determine predictors of proper mask usage (such as educational background, socioeconomic background, history of having prior severe respiratory conditions, and supply and availability of masks) are warranted.

CONCLUSION

Compliance of older adults with using masks during a non-epidemic period was low. The commonly omitted steps of wearing and taking off a mask were related to hand hygiene. We recommend using the knowledge-attitude-practice model to rectify misconceptions and strengthen awareness on the use of masks in the required situations and on commonly omitted or incorrectly performed techniques.

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DECLARATION

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