

## Shielding Health: Unleashing the Power of Nurse Education and Display Materials to Embrace Cough Etiquette among Respiratory Patients in a Tertiary Care Hospital

Bency K. Thomas<sup>1</sup>, Sanjoy Joseph George<sup>2</sup>, Cijo Alex<sup>3</sup>, Abel K Samuel Johnson<sup>4</sup>, Vishnu B. Menon<sup>5</sup>

<sup>1</sup>MD (Respiratory Medicine), Associate Professor, Dept. of Pulmonary Medicine, Pushpagiri Institute of Medical Sciences & Research Center, Thiruvalla

<sup>2</sup>MD (Internal Medicine), Assistant Professor, Dept. of General Medicine, Al Azhar Medical College, Thodupuzha

<sup>3</sup>MD (Psychiatry), Associate Professor, Dept. of Psychiatry, Believers Church Medical College Hospital, Thiruvalla, 689103

<sup>4</sup>MD (Community Medicine), Professor of Community Medicine, Believers Church Medical College Hospital, Thiruvalla, 689103

<sup>5</sup>MD (Community Medicine), Senior Resident, Community Medicine, Amrita Institute of Medical Sciences & Research Centre, Kochi

Received: 25-05-2024 / Revised: 23-06-2024 / Accepted: 26-07-2024

Corresponding Author: Dr. Abel K. Samuel Johnson

Conflict of interest: Nil

### Abstract:

Droplet transmission is one among the most common methods of transmission of communicable diseases. Respiratory hygiene practices are effective to break the transmission. This study was aimed at assessing the effectiveness of nurse education and display materials in improving the respiratory hygiene practices among admitted patients. Visual alerts were placed at strategic locations in the ward and trained nurses explained cough hygiene practices to all the admitted patients. With the help of a pre-designed questionnaire the patients were enquired about their cough hygiene practises before and after implementation of the intervention. Results show that pre-interventional only 16.7% participants covered their cough always. After the intervention was implemented, there was an increase in compliance to the cough etiquette maneuvers- tissue usage increased by 26.2% and usage of flexed elbow by 54.74% from 7.1% and 3.6% respectively. Thus the study shows that nurse education and display materials are effective measures that help in increasing the awareness of respiratory hygiene.

**Keywords:** Intervention, Display Materials, Coughs Etiquette, Infection Prevention, Respiratory Hygiene, Infection, Nurse Education.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

### Introduction

The pandemic has paved the way for highlighting the overwhelming importance of respiratory hygiene [1]. Thousands of health workers were infected with COVID infection by droplet transmission, and outbreaks have been reported among admitted hospital patients, nursing homes, and other healthcare facilities due to a lack of respiratory hygiene practices [2].

Droplet transmission is one of the most common methods of transmission of diseases. Pathogen-carrying droplets provide a vector for the spatial spread of infections [3]. Serious respiratory illnesses like tuberculosis, influenza, Respiratory Syncytial Virus (RSV), whooping cough, and Severe Acute respiratory syndrome (SARS) can be

spread by coughing, sneezing, and unclean hands. Airborne infections are a significant public health concern, especially in hospitals, schools, and public spaces [4]. Research has established that non-pharmaceutical public health interventions are the means to contain, delay the spread, and reduce the impact of airborne diseases [5].

Respiratory hygiene behaviours include properly covering the cough, known as cough etiquette practices, and hand hygiene (6). Cough etiquette practices include covering the cough using tissue paper, a handkerchief, and the flexed elbow when the latter is unavailable. Hand hygiene practices have been shown to reduce respiratory infections significantly [7]. Even though there is a lack of

strong evidence for Cough etiquette practices, studies have shown that participants following the behaviors have a lesser incidence of the disease (8) (9). Hospital-based infection control measures such as hand hygiene and cough etiquette play a very significant role in preventing the spread of infection [6]. The Center for Disease Control, Atlanta, also endorsed the cough etiquette recommendations to mitigate the spread of respiratory-borne pathogens. It is not recommended to cough or sneeze into the hands as an estimated fifty percent of Respiratory Tract Infections are linked to hand-borne transmission [10].

Lack of awareness and the inconsistent application of infection control guidelines increase the risk of transmission of airborne infections in hospitals or elsewhere [11]. Generating awareness in the community is an important step in curtailing the transmission of airborne infections. This study is an attempt to improve cough hygiene practices with the help of display materials and nurse education among patients admitted to the respiratory ward so as to break the transmission of the infection in the community.

### Methods

The present study was planned as a quasi-experimental study to evaluate the effectiveness of display materials and nurse education in improving respiratory hygiene practices. The study was done in a tertiary care teaching hospital in Central Kerala for a period of two months. All the patients admitted in the male and female wards of the respiratory medicine department were included in the study after obtaining written informed consent. Critically ill patients were excluded from the study. Approval from the Institutional Ethics Committee of Believers Church Medical College was obtained (IEC No. IEC/2019/01/54).

With the help of a pre-designed & pre-tested questionnaire, patients were enquired about their respiratory hygiene practices before and after the implementation of awareness interventions. The pre-intervention questionnaire included basic personal details as well as questions to assess their present cough hygiene practices. This also included a binary question in which the investigator asked the participants if they were aware of cough etiquette practices. This was to assess the knowledge of respiratory hygiene among the participants.

Post-intervention, the participants were asked whether they had understood the health awareness provided using Yes or No questions. The investigators ensured that the interval between the pre and post-interventional interviews was more

than three weeks. The participants were also asked if they would spread cough etiquette awareness to their friends or relatives so as to assess the outreach the intervention program may have outside the hospital.

The interventions were developed by the investigators based on the guidelines from the World Health Organization and CDC. Training on cough etiquette was given to all the nursing staff by a Pulmonologist and investigator. Posters explaining cough etiquette (in regional language) were placed at a strategic location in the wards. The trained nurses explained respiratory hygiene practices to all admitted patients in the respiratory ward. The data was collected on the use of single or disposable tissues, flexed elbow/upper arm sleeves for covering cough (instead of covering with a hand), and hand rub provided to each patient.

Assuming the awareness of cough etiquette to be only 10% (12) and the awareness program will increase it to 30%, with the assumption of 5% alpha error and power of the study as 90%, the minimum sample size calculated was 82. The data were entered into Microsoft Excel and analysed using JASP V.18. Proportions were calculated. A test of proportion was used to estimate the effect of the awareness program on the subjects.

### Results

Most of the participants were more than 50 years old and were males. A good majority (53.5%) of the participants were unemployed (Table 1). About 44.1 % of participants were educated till high school. The habit of 'Covering cough' always was seen only in 16.7% of participants (Table 2). Only 6% (n=5) of the participants had proper knowledge and awareness about cough hygiene practices. During the health education activity, the level of understanding was elicited, with 86% of participants understanding the importance of the use of tissue while coughing, 69% understanding the importance of putting used tissue in the dustbin, and 72% confirming the importance of the use of hand wash and hand rub respectively (Table 3).

Close to the majority of the participants followed the Practice of hand washing, usage of hand rub, and tissue disposal following the intervention (Table 4). Post-intervention, there was increased compliance with cough etiquette practices among participants (Table 5), ranging from 33% (for tissue/handkerchief usage) to 59% for other practices. The results were statistically significant. More than 50% of participants reported that they would spread awareness of cough etiquette practices to their friends and relatives.

**Table 1: Socio-demographic characteristics (n = 84)**

	Frequency	Percent
Male	36	43
Female	48	57
<b>Age distribution</b>		
< 50 years	17	21
51 - 60 years	23	27
61-70 years	23	27
71-80years	18	21.4
>81 years	3	3.6
<b>Education</b>		
Lower Primary	01	1.2
Upper Primary	24	28.6
High School	37	44.1
Higher Secondary	10	11.9
Graduates & Above	12	14.2

**Table 2: Practice covering mouth and nose while coughing (n=84)**

	Frequency	Percent	95% C.I.
Always	14	16.7	10-30
Often	36	42.9	30-50
Sometimes	12	14.3	08-20
Rarely	16	19.0	10-30
Never	6	7.1	02-10

**Table 3: Level of understanding of the health education activity (n=84)**

Etiquette	Frequency (%)	95% CI
Tissue usage	72 (86)	80-90%
Proper disposal of tissue	69 (58)	70-90%
Flexed elbow	72 (86)	80-90%
Hand wash	72 (86)	80-90%
Hand rub	68 (81)	70-90%

**Table 4 Practices in Cough Hygiene the following intervention**

Following the cough, the Practice of	Regularly n(%)	Sometimes n(%)	Rarely n(%)	Never n(%)
Hand washing	31 (37)	19 (23)	18 (21)	16 (19)
Use of Hand rub	38 (46)	15 (18)	08 (09)	23 (27)
Disposal of tissue in a dustbin	43 (47)	21 (25)	04 (04)	20 (24)

**Table 5: Cough hygiene practices - Pre Intervention Versus Post-intervention (n = 84)**

		Pre		Post		P Value
		N	%	N	%	
Tissue/Handkerchief usage	Yes	06	07	28	33	<0.001
	Maybe	21	25	19	23	-
	No	57	68	37	44	-
Total		84	100	84	100	
Flexed Elbow	Yes	03	04	49	59	<0.001
	No	81	96	35	42	
Total		84	100	84	100	
The preferred method when tissue is not available	Flexed elbow	02	02	48	57	<0.001
	Hand	76	90	34	41	-
	None	06	08	02	03	-
Total		84	100	84	100	

## Discussion

The present study was conducted as an attempt to improve the respiratory hygiene practices among patients in the respiratory ward of a tertiary care

hospital to break the chain of transmission of respiratory infection from the patients into the community. Proper health education was given to this bridge population and brought improvement in

their respiratory hygiene practices. However, we were unable to assess the effectiveness of this intervention in the community.

An observational study done by Yin Mo, David Eyre et al. in the U.K. among patients admitted to four tertiary care hospitals found that exposure to patients with COVID-19 is associated with a substantial infection risk to the community [13]. Infection control practices need to be strongly implemented to limit the spread of nosocomial infections.

The present study found that knowledge of cough etiquette was found to be very low (nearly 6%) among the participants. A similar hospital-based study done by James et al. found that the awareness among the hospital staff and patients regarding respiratory hygiene is poor (11). But studies from High-Income countries found that the knowledge of and compliance with cough etiquette among nursing and allied health college students was found to be more than 55% (14). This is because of the increased political and administrative will to implement the importance of respiratory hygiene practices at the school level.

In the present study, a pre-interventional analysis of the habit of 'Covering cough' showed that only 16.7% of participants covered their cough always. The remaining 83% covered their cough irregularly and not always. An observational study titled by S. Nasreen et al. from rural Bangladesh reported similar results that 81% of the participants coughed or sneezed in the open air on most occasions [12]. Another observational study done in Europe by Wolff R found that 86% of the participants coughed into their hands [15]. Another study done among university students by Berry TD et al. found that only less than one-quarter of students used a sleeve arm, elbow, or tissue as advised by the CDC [16].

The present study showed an increase in the habit of covering cough following the intervention. There was increased compliance to cough etiquette practices among participants, with 33% of the participants using tissue/handkerchief to 59% for other practices. The increased compliance may be due to the fact that all participants had formal education. A community-based observational study conducted by Barry T et al. following the 2009 influenza pandemic in a developed country showed improved results, with 34 % of people using tissue [17].

Pre-intervention, most participants (90%) preferred hands over flexed elbows when tissues were not available. Thus there were only a few following cough etiquette guidelines (as per CDC) among the study participants. The usage of the flexed elbow was found to be the least followed etiquette; this can be due to lesser awareness among the public

about the specific hygiene practice. Unlike developed countries, where school education incorporates cough etiquette practices, in our state, there is a lack of education about respiratory hygiene in schools, and so the low level of Practice among the participants. Post-intervention, while coughing, tissue usage increased from 7.1% to 26.2%, and the use of flexed elbows increased from 3.6% to 54.74%. The higher increase in the usage of flexed elbow than tissue usage may be correlated with the feasibility and affordability, tissue usage being a costlier choice. Furthermore, the level of understanding on hand washing and hand rub usage was 72% and 68%, respectively, after providing the health education activity, even though it didn't turn into an active routine. Thus the intervention succeeded in bringing awareness to hand hygiene practices among the study population.

However, only 36.9% of participants reported that they followed hand washing 'always or 'very often after coughing or sneezing, and only 45.2% reported they used the provided alcohol-based hand rubs 'always or very often. The usage of hand rub was more as compared to that of hand washings in alcohol-based hand rubs provided for each bed in the ward. However, in a domestic setting where hand rubs are often not available, the usage might be further low. Thus more measures must be taken to improve compliance with hand hygiene practices. The level of understanding of the interventional activity was satisfactory. This might have been due to the combined effect of the display materials and the health awareness provided by the nursing staff. 63 % of participants also reported that they would spread awareness of cough hygiene to their friends and relatives.

However, the study also has the following limitations. Firstly, two interventions, i.e., nurse education and display materials, were combined. Hence the effect each intervention has individually cannot be assessed. The effects of multimodal interventions are always biased as it is difficult to identify which strategy made it successful (18). Thus, nurse education and display materials are effective measures that help in increasing the awareness of cough etiquette maneuvers which will, in turn, help in the reduction in droplet transmission of diseases.

### Conclusion

This study underscores the paramount importance of implementing effective respiratory hygiene practices, particularly in the context of pandemics and airborne disease outbreaks. Nurse education and the strategic use of display materials have proven to be powerful and practical tools in enhancing awareness and compliance with proper cough etiquette. By imparting essential knowledge and guidance to patients, healthcare professionals

can foster a culture of responsible respiratory hygiene, significantly reducing the risk of transmission within healthcare facilities and the broader community.

**Acknowledgements:** The authors would like to thank Late. Ms. Neeraja K. Suresh for helping with infographics and data collection.

## References

- Jayaweera M, Perera H, Gunawardana B, Manatunge J. Transmission of COVID-19 virus by droplets and aerosols: A critical review on the unresolved dichotomy. *Environ Res*. 2020 Sep; 188:109819.
- Lohela-Karlsson M, Condén Mellgren E. Health Consequences of the COVID-19 Pandemic among Healthcare Workers: A Comparison between Groups Involved and Not Involved in COVID-19 Care. *Healthcare*. 2022 Dec 15; 10(12):2540.
- Stilianakis NI, Drossinos Y. Dynamics of infectious disease transmission by inhalable respiratory droplets. *J R Soc Interface*. 2010 Sep 6; 7(50):1355–66.
- Klevens RM, Edwards JR, Richards CL, Horan TC, Gaynes RP, Pollock DA, et al. Estimating Health Care-Associated Infections and Deaths in U.S. Hospitals, 2002. *Public Health Rep*. 2007 Mar; 122(2):160–6.
- World Health Organization Writing Group, Bell D, Nicoll A, Fukuda K, Horby P, Monto A, et al. Non-pharmaceutical interventions for pandemic influenza, international measures. *Emerg Infect Dis*. 2006 Jan; 12(1):81–7.
- Chavis S, Ganesh N. Respiratory Hygiene and Cough Etiquette. In: DePaola LG, Grant LE, editors. *Infection Control in the Dental Office* [Internet]. Cham: Springer International Publishing; 2020 [cited 2023 May 4]. p. 91–103. Available from: [http://link.springer.com/10.1007/978-3-030-30085-2\\_7](http://link.springer.com/10.1007/978-3-030-30085-2_7)
- Bloomfield SF, Aiello AE, Cookson B, O'Boyle C, Larson EL. The effectiveness of hand hygiene procedures in reducing the risks of infections in home and community settings, including handwashing and alcohol-based hand sanitizers. *Am J Infect Control*. 2007 Dec; 35(10):S27–64.
- Aledort JE, Lurie N, Wasserman J, Bozzette SA. Non-pharmaceutical public health interventions for pandemic influenza: an evaluation of the evidence base. *BMC Public Health*. 2007 Dec; 7(1):208.
- Stebbins S, Cummings DAT, Stark JH, Vukotich C, Mitruka K, Thompson W, et al. Reduction in the incidence of influenza A but not influenza B associated with the use of hand sanitizer and cough hygiene in schools: a randomized controlled trial. *Pediatr Infect Dis J*. 2011 Nov; 30(11):921–6.
- Calcagni N, Venier AG, Nasso R, Boudin G, Jarrige B, Parneix P, et al. Respiratory infection prevention: perceptions, barriers, and facilitators after SARS-CoV-2. *Infect Dis Health*. 2023 Feb; 28(1):54–63.
- James PT, Kunoor A, Rakesh PS. Awareness of health care workers, patients and visitors regarding airborne infection control – A descriptive study from a Tertiary Care Centre in Kerala, southern India. *Indian J Tuberc*. 2018 Apr; 65(2):168–71.
- Nasreen S, Azziz-Baumgartner E, Gurley ES, Winch PJ, Unicomb L, Sharker MAY, et al. Prevalent high-risk respiratory hygiene practices in urban and rural Bangladesh: High-risk respiratory hygiene practices. *Trop Med Int Health*. 2010 Jun; 15(6):762–71.
- Mo Y, Eyre DW, Lumley SF, Walker TM, Shaw RH, O'Donnell D, et al. Transmission of community- and hospital-acquired SARS-CoV-2 in hospital settings in the U.K.: A cohort study. *PLoS Med*. 2021 Oct; 18(10):e1003816.
- Kim OS, Kim KM, Oh JH. Knowledge of and Compliance with Cough Etiquette among Nursing and Allied Health College Students. *Korean J Nosocom Infect Control*. 2012; 17(2):61–9.
- Wolff R. No Cover-Up Here: A Descriptive Study of Observations of Coughing on Hands and the Lack of Proper Respiratory Hygiene Behaviors or Cough Etiquette. *SSRN Electron J* [Internet]. 2020 [cited 2023 May 12]; Available from: <https://www.ssrn.com/abstract=3565981>
- Berry TD, Fournier AK. Examining university students' sneezing and coughing etiquette. *Am J Infect Control*. 2014 Dec; 42(12):1317–8.
- Barry T, Manning S, Lee MS, Eggleton R, Hampton S, Kaur J, et al. Respiratory hygiene practices by the public during the 2009 influenza pandemic: an observational study: Respiratory hygiene during a pandemic. *Influenza Other Respir Viruses*. 2011 Sep; 5(5):317–20.
- Gould DJ, Moralejo D, Drey N, Chudleigh JH, Taljaard M. Interventions to improve hand hygiene compliance in patient care. *Cochrane Effective Practice and Organisation of Care Group*, editor. *Cochrane Database Syst Rev* [Internet]. 2017 Sep 1 [cited 2023 May 12]; 2017(9). Available from: <http://doi.wiley.com/10.1002/14651858.CD005186.pub4>.