Facemasks for Source Control: Testing Influenza Transfer to Bedside Tables

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BACKGROUND

According to the World Health Organization, influenza results in 250,000 to 500,000 deaths annually worldwide (Federici et al., 2018), yet there is limited research testing human subjects on the effectiveness of facemasks in preventing influenza transfer/transmission. Wearing facemasks for source control has come to immediate attention because of the worldwide spread of novel coronavirus 2019 (SARS-CoV-2). This pandemic has highlighted the potential threat to humanity by respiratory viruses such as SARS-CoV-2 or influenza. In this pilot study we investigated the question, "In influenza-positive Veterans, what is the effect of facemask wearing in comparison to not wearing a facemask on influenza transfer to bedside tables measured for two hours per condition over a ten-week time frame during the 2019/2020 influenza season?"

METHODS

Influenza-positive Veterans with influenza symptom onset $\leq$ 120 hours admitted to the Salem Veterans Affairs Medical Center were recruited to participate in this study. Exclusion criteria included critical illness requiring an oxygen mask or intubation. The Precept® FluidGard® 160 Procedure Mask 15300, Precept Medical Products, Inc., Arden, NC was worn by all participants during the two-hour intervention period. Surface swabs were used to measure the presence of influenza on bedside tables. CDC/NIOSH tested for influenza A and B from surface samples and facemasks using real-time polymerase chain reaction (PCR) assay (TaqMan ThermoFisher Scientific). Demographic information was collected. A study questionnaire collected qualitative data on tolerability and feasibility of wearing a facemask when hospitalized with influenza. Institutional Review Board approval was granted.

Table 1. Clinical characteristics of participants

Participant	Age range (years)	Influenza type	$T_{max\,(°F)}$ on study date	oseltamivir 75mg (# doses received)	Pertinent medical history
1	65-74	B	99.7	2	COPD, diabetes, cigarette smoking
2	65-74	A	98.5	2	
3	75-84	A	98.4	2	
4	85-94	B	98	2	
5	65-74	A	98.1	2	COPD, diabetes
6	65-74	A	98.4	2	pneumonia, COPD, cigarette smoking
7	55-64	A	98.4	4	
8	25-34	A	100.3	1	cigarette smoking

Table 2. Influenza A or B detection on surfaces

N=8	Nasopharyngeal swab (total M1 copies in sample)	Worn mask	Bedside table before mask intervention	Bedside table after mask intervention	Bedside table before unmasked intervention	Bedside table after unmasked intervention
1	DNQ*	UD	UD	UD	UD	UD
2	2.40E+03	DNQ	UD	UD	UD	UD
3	46.0	UD	UD	UD	UD	UD
4	UD*	NA	NA	NA	NA	NA
5	2.94E+03	DNQ	UD	UD	UD	UD
6	no sample	DNQ	NA	NA	NA	NA
7	2.64E+02	UD	UD	UD	UD	UD
8	UD	UD	NA	NA	NA	NA

DNQ = detectable but not quantifiable; *denotes influenza B, UD = undetected; NA = not assayed

RESULTS

Eight Veterans completed the study from January 2, 2020 to March 11, 2020. Mean age was 67 years, all were male. Six of eight had influenza A, and two had influenza B. Half were diabetic; all received oseltamivir. Neither influenza A nor B was detected by qPCR on bedside tables for any of the eight participants under either facemask-wearing condition. Relative room humidity ranged from 15.6%-39.8%. All participants reported wearing the facemask was easy or very easy; of these, five reported experiencing warmth from the mask. Fifty percent of participants selected two hours as the time frame they could tolerate wearing a mask; the other 25% specified they could wear the facemask for three hours or five hours or more, respectively.

Table 3. Number of hours participants tolerated facemask-wearing condition, general experiences wearing facemask, and opinion about ease or difficulty wearing the facemask

	N (%)
Two hours	4 (50)
Three hours	2 (25)
Five hours or more	2 (25)
Warmth	5 (62.5)
General discomfort	3 (37.5)
Shortness of breath	1 (12.5)
No discomfort	2 (25)
Easy or very Easy	8 (100)

CONCLUSIONS

- This pilot study will guide future research and it demonstrated wearing facemasks is a tolerable infection control practice for providing source control for inpatients with influenza
- Because a major limitation was the small size of the study, associated with lack of viral capture, a larger study is planned
- Using facemasks for source control in inpatients with influenza and other respiratory virus infections should be considered a standard infection control practice

Reference
1. Federici, C., Cavazza, M., Costa, F., & Jommi, C. (2018). Health care costs of influenza-related episodes in high income countries: A systematic review. *PLOS One, 13*(9), 1-15. https://doi.org/10.1371/journal.pone.0202787