
Correspondence

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Influence of household contacts on the effectiveness of face masks for preventing influenza in a healthcare setting: a comment on Cowling *et al.* (2010)

To the Editor:

In their recent review of face-mask use to prevent influenza infection Cowling *et al.* [1] found little evidence that face masks prevent influenza infection in healthcare settings. Of the healthcare-setting studies presented, only 2/6 showed some evidence of effectiveness, with three of the four community studies finding some evidence that masks (alone or in conjunction with hand-washing) were protective.

Demonstrating the effectiveness of respiratory protective equipment in healthcare settings is complicated by the potential for additional exposures to infectious individuals when at home. The risk of infection in households with an infectious influenza patient is high, with recorded secondary attack rates between 6% and 38% [2, 3], and a significantly increased risk for transmission when the patient is a child [4]. The review did not document whether the studies had allowed for this influence.

One of the studies cited was a randomized controlled trial, which did not find a statistically significant difference in overall attack rates in healthcare workers (HCWs) who at work used N95 or surgical masks, respectively [5]. Despite apparent good adherence, attack rates were high (23·6% vs. 22·9%), which the authors attributed to repeated exposures, presumably in the hospital. Over 20% of participants in either group had reported exposure to a spouse or room-mate with influenza-like illness, with similar exposure prevalence in both intervention groups. While stating that household exposure was ‘balanced’ Cowling *et al.* further noted that ‘it is impossible to

determine whether participants acquired influenza due to hospital or community exposure’.

We have recently published a comparison of influenza risk in HCWs with non-HCWs, and found that attack rates (as determined serologically) during the influenza season did not differ between groups [6]. Instead the influenza risk to HCWs was influenced more by their household contacts than their occupation. People living with children were at significantly increased risk, and those living with three or more children had a higher risk for infection than those with one or two. This is in line with the findings of another of the papers cited in the review, a randomized controlled trial of mask use in HCWs, where living with children was the only significant risk factor for reported cold symptoms [7].

Hospital contacts are usually time-limited and should involve proper infection control precautions, whereas household contacts, especially where the care of an infectious child is involved, are usually unprotected and prolonged. It is therefore quite plausible that household risk factors may exceed those in the hospital setting. Therefore, in studies of the effectiveness of personal protective equipment in healthcare settings, any real protective effect against respiratory viruses is at risk of being diluted by the period spent unprotected in the household, which might account for the lack of effect seen in most of the healthcare studies in Cowling *et al.*'s review.

Because of the competing infection risk from the community it is important that studies investigating risks and prevention measures in the healthcare setting are conducted in situations where the infection pressure is substantially higher than in the community, or make some attempt to limit or control for community exposure. This may be the case in defined outbreak situations, or when – for example through the type of work, such as conducting aerosol-generating procedures – infection risk at the

work site of the HCW substantially exceeds community risk.

Declaration of Interest

None.

References

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C. J. WILLIAMS¹, U. BUCHHOLZ²

¹ Health Protection Agency – Norfolk, Suffolk and Cambridgeshire Health Protection Unit, Norfolk Office, Thetford Community Healthy Living Centre, Thetford, Norfolk, UK

² Department for Infectious Disease Epidemiology, Robert Koch Institute, Berlin, Germany
(Email: kitwilliams@doctors.org.uk)

The authors reply

We thank Williams *et al.* for making some very useful points. We fully agree with their observation that substantial risk of infection outside the workplace is likely to complicate studies of the effectiveness of masks and other protective equipment in health-care settings. It would be very important for further studies to be carefully designed to address this, for example by explicitly incorporating household contacts in a study, extending interventions to the home setting in addition to the workplace, or by measuring the amount of time spent at home *vs.* at work and the number of contacts in each setting that could lead to transmission. Nevertheless, healthcare workers typically spend a significant part of their waking day at the workplace, and similar home exposures may not completely account for the lack of difference between N95 and surgical masks observed in a previous study [1].

Reference

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B. J. COWLING¹, A. E. AIELLO²

¹ Department of Community Medicine, The University of Hong Kong

² Department of Epidemiology, Center for Social Epidemiology & Population Health, School of Public Health, University of Michigan, Ann Arbor, MI, USA
(Email: bcowling@hku.hk)