

# Risk of COVID-19, Influenza, and Other Respiratory Infections in Both Hospital and Community Settings

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## Editorial Note

### Mask controversies

During the COVID-19 pandemic, the use of mask has been hotly debated in medical, public health, industrial hygiene and general population circles [1]. Some people have complained about possible discomforts of mask use such as increased risk of headaches, facial irritation, increased work of breathing, trouble talking, and psychological concerns [1,2]. Most studies report that many respiratory viruses such as influenza and SARS-CoV-2 travel predominantly on droplets >5 µm which can often be effectively captured by face masks [3]. For a very detailed and well referenced review of the use of masks for control of COVID-19 and other respiratory infections please consult Deng, et al. [4].

Most studies and meta-analysis show masks can significantly reduce risk of influenza, COVID-19 and other respiratory infections. However, most of the available literature seems to suggest that use of masks is effective in controlling many respiratory infections including SARS-CoV-2, Influenza, and other respiratory infections. The following discussion will attempt to concisely summarize the recent studies and meta-analyses which examine the relationships between mask usage and respiratory viral infections. Six of 7 large and statistically robust meta-analysis have reported that use of N95, surgical, and other masks are associated with significantly lower rates of COVID-19, influenza, and other respiratory infections in both hospital and community settings [5-11]. Results of these 7 studies will be briefly described below and in Table 1.

Study	Community or Hospital based study	Type of pathogen (s)	Number of studies and total number of participants	Results Mask vs. Non Mask use
Offeddu, et al. [10]	Hospital	Respiratory infections	16 case control or cohort studies with 1,750 participants	OR 0.22, 95% CI 0.12-0.40
Talic, et al. [11]	Community	COVID-19	6 Studies with 389,228 participants	RR 0.47, 95% CI 0.28 to 0.75
Chaabna et al. [6]	Community	Influenza, Influenza like illness, COVID 19	12 Studies with 8,746 Participants	OR=0.66, 95% CI 0.54-0.81

Li, et al. [8]	Community	Influenza like infections	8 Randomized controlled trials with 5,243 participants	OR 0.79, 95% CI 0.71-0.88
Chen, et al. [12]	Community and Hospital	Influenza, COVID-19 and middle east coronavirus syndrome	18 Case control studies-4,326 participants, 8 cohort studies with 1,968 participants, 6 randomized controlled trials with 7,025 participants	Case control or 0.36, 95% CI 0.26-0.48 cohort OR 0.31, 95% CI 0.22-0.44 randomized controlled trials or 0.66, 95% CI 0.50-0.88
Li, et al. [9]	5 Hospital and 1 community setting	COVID-19	6 Studies with 1,726 participants	OR 0.38, 95% CI 0.21-0.69
Baier, et al. [5]	Community studies	Laboratory confirmed respiratory infections	7 Studies with and without hand hygiene interventions	Without hand hygiene interventions RR 1.04, 95% CI 0.60-1.80 with hand hygiene interventions RR 0.79, 95% CI 0.51-1.51

**Table 1:** Summary of meta-analyses which have examined relationships.

Masks reduce risk of hospital acquired respiratory infections by 78%. Offeddu et al. analyzed 29 peer reviewed papers which studied the relationships between N95 and Surgical Mask use in hospitals and respiratory infection rates. Use of a surgical mask or N95 mask among health care workers was associated with a 78% drop in respiratory infections (OR 0.22, 95% CI 0.12-0.40, 16 case control or cohort studies with a total of 1,750 participants) [10].

Masks reduce risk of COVID-19 transmission by 53% in community settings. Meta-analysis of 6 community studies reported that mask wearing was associated with a 53% reduced risk of COVID-19 transmission (RR 0.47, 95% CI 0.29 to 0.75, 2,627 people with COVID-19 and a total of 389,228 participants) [11].

Community use of masks reduces risk respiratory infections by 34%. A 2021 meta-analysis of 12 studies involving community use of face masks to prevent influenza, influenza like-illness, and SARS-CoV-2 transmission reported mask use was associated with a 34% decrease in these respiratory diseases (OR=0.66, 95% CI 0.54-0.81, total of 8,746 participants) [6].

Community mask use cut risk of influenza like infection by 21%. A study of 8 RCTs (Randomized Controlled Trials) reported that masks use in community settings were associated with a 21% drop in influenza-like respiratory infections (OR=0.79, 95% CI 0.71-0.88, 5,243 total participants) [8].

Community and hospital mask use cuts respiratory infection risk by 64%. A large meta-analysis of 31 of a combination health care workers and community studies analyzed relationships between mask usage and infections from influenza, SARS-CoV-2, and Middle East Coronavirus Syndrome. Mask usage was associated with a 64% drop in respiratory infections in 18 case control studies (OR 0.36, 95% CI 0.26-0.48, 4,326 participants), a 69% drop in 8 cohort studies (OR 0.31, 95% CI 0.22-0.44, 1,968 participants) and a 34% drop in 6 randomized controlled trials (OR 0.66, 95% CI 0.50-0.88, 7,025 participants) [12].

Use of face masks reduces COVID-19 transmission by 62% hospital and community settings. Meta-analysis of 5 hospital and 1 community studies found that face masks were associated with a 62% reduction in COVID-19 risk (OR 0.38, 95% CI 0.21-0.69, total of 1,726 participants) [9].

While many studies and meta-analyses have reported associations between mask wearing and clinical diagnosed respiratory infections- the relationships between mask wearing and clinically diagnosed respiratory infection are less clear. A meta-analysis of 7 published community based studies (10,531 participants) reported that mask wearing was not associated with a significant change in laboratory confirmed respiratory infections (RR 1.04, 95 CI 0.60 to 1.80) while masking combined with enhanced hand hygiene was associated with a non-significant drop in laboratory-confirmed respiratory infections (RR 0.79, 95% CI 0.52-1.51) [5].

Masks helpful in controlling other airborne infections such as aspergillus and tuberculosis. Masks can be useful in preventing spread of other hospital and community infections such as aspergillosis and particle respirator masks can be useful for preventing spread of tuberculosis [13,14].

### **N95 versus surgical masks**

**Comparative efficacy to reduce respiratory infections:** A number of studies have compared efficacy of the N95 and surgical masks- the two most common forms of masks used in hospital and community settings. A 2020 meta-analysis of 6 Randomized Controlled Trials (RCTs) involving a total 9,171 health care workers reported that use of N95 masks versus surgical masks was associated with statistically insignificant differences with laboratory- confirmed influenza (RR=1.09, 95% CI 0.92-1.28) and laboratory confirmed respiratory viral infections (RR=0.89, 95% CI 0.70-1.11). On the other hand, a later August 2021 meta-analysis of 6 health care workers studies (3 randomized controlled trials, 1 cohort, and 2 case-control studies) reported that N95 mask usage was associated with significantly lower rates or influenza-like illness as compared to surgical masks (RR 0.81, 95% CI 0.68-0.94) [15,16].

**Multiple interventions to control infections best:** Masks, hand

washing, cleaning surfaces, air filters. Many factors are involved in the transmission of respiratory viruses and a multifactorial infection control bundled including masks, hand washing, cleaning of surfaces, air filters, vaccination, good nutrition, and many other factors are needed for optimum infection control [17-20].

### **Conclusion**

Although common masks such as N95 and surgical masks are far from perfect, they do offer considerable and statistically significant protection from COVID-19, influenza, and other respiratory infections in almost all meta-analysis. Nearly all meta-analyses from both hospital based and community studies report that mask usage is associated with significant declines in rates of influenza, COVID-19, and other airborne respiratory infections at rates varying from 21% to 78%. This large variation in efficacy of mask usage is probably due to a number of factors including types of masks used; mask fit and instruction in mask usage, levels of respiratory infection in population, hand washing, surface cleaning, and many other factors.

The one exception to the lower rates of respiratory infection seen in mask usage was seen in the Baier meta-analysis, which reported that masks usage was not related in significant drops of laboratory confirmed influenza and other viral infections. Much more research is needed on the use, efficacy and adverse side effects. However, it seems clear that masks significantly reduce respiratory infections in most hospital and community settings and should be recommended in any situation in which the risk of respiratory infection is significant.

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