

ROLE OF SOCIAL DISTANCING, HAND HYGIENE AND WEARING MASK IN CONTROLLING COVID-19 PANDEMIC: A REVIEW

Santosh Kumar Swain^{1*}, MNAMS; Pragnya Paramita Jena, MD²; Somadatta Das, MA³

1. Department of Otorhinolaryngology, IMS and SUM hospital, Siksha "O" Anusandhan University, K8, Kalinganagar, Bhubaneswar-751003, Odisha, India.
2. Department of Microbiology, IMS and SUM hospital, Siksha "O" Anusandhan University, K8, Kalinganagar, Bhubaneswar-751003, Odisha, India.
3. Central Research Laboratory, IMS and SUM hospital, Siksha "O" Anusandhan University, K8, Kalinganagar, Bhubaneswar-751003, Odisha, India.

Correspondence: Santosh Kumar Swain, santoshvoltaire@yahoo.co.in

ABSTRACT

BACKGROUND:

Coronavirus disease 2019 (COVID-19) continues to spread all over world and is outpacing the resources and capacity of health care systems. This rapidly spreading COVID-19 infection is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and has been challenging the medical community and keeping the whole world in great threat to an unprecedented degree.

OBJECTIVES:

The objective of this review article is to describe details of social distancing, hand hygiene and wearing face masks including their role in controlling the current COVID-19 pandemic.

METHOD:

We conducted an electronic search of Google Scholar, Scopus, Medline and PubMed databases for articles between June to September 2021.

RESULTS:

The novel SARS-CoV-2 virus is transmitted from person to person by respiratory droplets or contact with an infected person. There are no established medications and vaccine available until now to restrain the transmission of the COVID-19 infection. Currently, social distancing, hand hygiene and wearing a mask are key steps to lower the transmission of the SARS-CoV-2 virus in COVID-19 pandemic. As this infection is highly contagious via a respiratory pathway through coughing, sneezing and contact with an infected surface, the spread can be reduced by the proper practice of social distancing, hand hygiene or frequent hand washing and wearing mask. These universal precautions should be done as COVID-19 patients may be asymptomatic.

CONCLUSION:

Social distancing, hand washing and wearing face masks are cheap and widely acceptable methods for the prevention of the COVID-19 infection. The goal of this review paper is to discuss social distancing, hand hygiene and face mask information, including its role in managing the current COVID-19 pandemic.

KEYWORDS

COVID-19 pandemic; Social distancing; Hand hygiene; Wearing mask.

INTRODUCTION

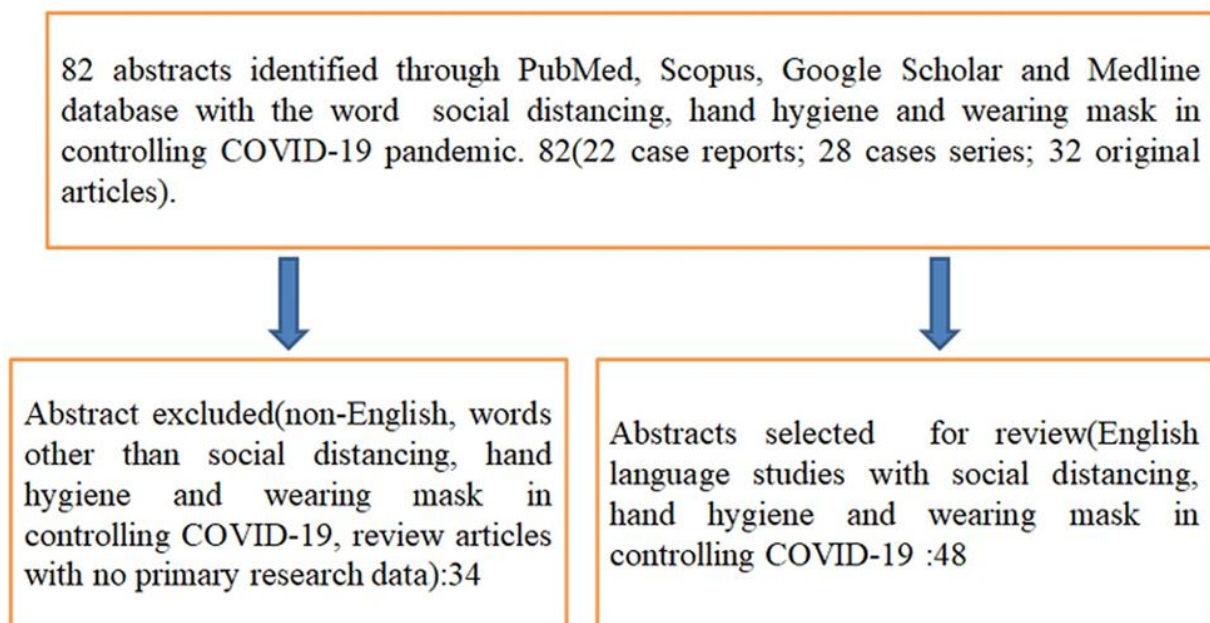
COVID-19 infection refers to an outbreak of the acute respiratory infection caused by a novel coronavirus, called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). [1] This infection was first started at Wuhan, Hubei Province of China and it has rapidly spread throughout the world. [2] COVID-19 infections have a dramatic impact on the health care systems even in the developed countries of the world. Vaccines and curative medicines against COVID-19 infections are not available to date. As there is no effective vaccine, the only choice to prevent this infection is to break the transmission link. In this context, public health actions are vital steps to reduce the transmission of the virus. Social distancing, hand hygiene and wearing masks are less expensive and widely acceptable preventive measures for both individual protection and pandemic prevention of the COVID-19 infections. [3] However, it is very difficult to maintain these three norms for effective compliance. In one study, it was found that most important recommendation of prevention of the COVID-19 infections by use of the face mask which protect from the coughing, sneezing from the infected persons along with hand washing and social distancing. [4] Maintaining the appropriate distance from people, avoiding the touching of the eyes, nose and mouth are also important advisories for prevention of COVID-19 infections. There are not many studies or literature regarding the role of social distancing, hand washing and wearing masks in the COVID-19 pandemic. This review

article focuses on the importance of social distancing, hand washing and use of face masks during current COVID-19 pandemic.

METHODS

We conducted an electronic search of Google Scholar, Scopus, Medline and PubMed databases for articles. The search terms in the data base included social distancing, hand hygiene, wearing face masks and COVID-19 pandemic. The abstracts of the published articles were identified manually from these citations. We started by searching the Scopus, PubMed, Medline, and Google Scholar databases online. A search strategy using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) guidelines was developed. This search strategy recognized the abstracts of published articles, while other research articles were discovered manually from the citations. Observational studies, comparative studies, case series, and case reports were evaluated for eligibility. There were a total number of 82 articles (32 original articles, 28 case series, 22 case reports) (Figure 1). This review examines the importance of social distancing, hand hygiene and wearing a face mask in controlling the current COVID-19 pandemic. This review article presents a baseline from where further studies can be designed regarding these universal precautions for controlling this dreaded pandemic as there are not many studies or reviews in medical literature.

FIGURE 1: FLOW CHART OF METHODS FOR LITERATURE SEARCH



EPIDEMIOLOGY

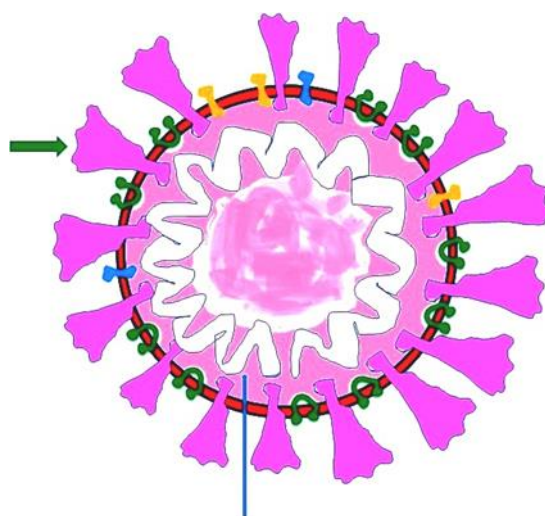
COVID-19 infection is a highly contagious disease of the respiratory tract. The first patient of the COVID-19 infection was reported in Wuhan, Hubei Province, China in late December 2019. [5] COVID-19 infections continue to spread and currently are affecting more than 200 countries and territories across the world. By February 27, 2020, more than 82,000 COVID-19 positive patients and more than 2,800 deaths were documented of which approximately 95% of the positive cases and 97% of deaths were in China. [6] By March 26th, 2020, there were 46,2684 positive cases of COVID-19 infection were reported in 199 countries. [7] By 20th July 2020, total of 14,348,858 persons were infected and 603,691 had died because of the COVID-19 infections in 213 countries. [8] While more than 30 countries showed highest level of response, the COVID-19 infection continues to spread in different parts of the world. [9] Strict lockdown leads to jeopardising people's livelihoods with vulnerability of the population or family going into poverty. The poverty may push towards the death of people because of the vulnerability to other diseases. Lockdowns can be relaxed with strictness with lifestyle actions such as social distancing, frequent hand washing and wearing face masks. As there is high vulnerability of the COVID-19 infection in the community, hand hygiene, use of face mask and social distancing are repeatedly emphasized for whole populations. [10] Most countries are now strictly following social distancing, hand washing and wearing face mask protocols. Adapting to these universal precautions, there is

slow decline of SARS-CoV-2 viral transmission in current life-threatening situations. Due to the fear of second waves of the COVID-19 pandemic, social distancing, hand washing and wearing face masks are now greatest priorities to minimize the morbidity and mortality due to COVID-19 infection.

COVID-19 VIRUS

The causative microbiological agent for COVID-19 infection was identified as a novel corona virus which was known as acute respiratory syndrome corona virus 2 (SARS-CoV-2) and this disease is called as corona virus disease 2019 (COVID-19) by World Health Organization (WHO). [11] SARS-CoV-2 (Fig 2) was earlier known as 2019-nCoV, positive-sense, single stranded RNA virus with diameter of 60 to 140 nm [11]. SARS-CoV-2 is included in the genus of beta corona virus. [12] So far, this is the seventh member of the corona virus family which can infect human being. The incubation period of SARS-CoV-2 ranges from 1 to 14 days with a median of 5-6 days. Although a recent study reports that the incubation period may extend to 24 days, [13] a longer incubation period has implications in quarantine policies and prevention of the spread of the disease. Respiratory droplets are primarily responsible for transmission of the infection. However, blood and stool can also cause transmission of the SARS-CoV-2 virus, so raises questions regarding the mode of transmission of the infection. [14]

FIGURE 2: STRUCTURE OF THE COVID-19 VIRUS (GREEN ARROW IS SPIKE PROTEIN OVER LIPID MEMBRANE, BLUE ARROW INDICATES RNA).



TRANSMISSION OF THE INFECTION

SARS-CoV-2 spreads by air-borne transmission, respiratory droplets and contaminated surfaces. [15] There are four patterns of the transmission of the COVID-19 infections, and these include community transmission, nosocomial transmission, household transmission and transmission of the infection in a closed environment. [16] Prevention of the viral transmission from human to human is the most challenging step in current COVID-19 pandemic. The rapid spread of the COVID-19 infection is mainly due to asymptomatic cases and travelling of the cases with or without symptoms. Certain surgical procedure like tracheostomy which is considered as aerosol generating procedures and high risk for exposing the aerosols from the air way to the health care professionals or others. [17,18] The common clinical symptoms of the COVID-19 patients are cough, fever, fatigue and dyspnea. There are some patients those are asymptomatic and considered as silent carriers in this pandemic. There are also symptoms like anosmia and taste alterations are two important features are associated with this patient. Therefore, health care workers should be aware about these symptoms and so can prevent from transmission to them and other patients. The procedures which deal with nose, nasopharynx, oral cavity, larynx and trachea which produces respiratory droplets, leads to transmission of the infections. After declaration of the COVID-19 infection as a pandemic by the WHO on 11 March 2020, most countries declared preparedness against COVID-19 such as lock-down, social distancing, hand washing and wearing face mask. Frequent hand washing, wearing masks and social distancing are the proven approach to slow the exponential spread of the SARS-CoV-2 in current threat situation of the COVID-19 pandemic. [19]

SOCIAL DISTANCING

Social distancing is also called as physical distancing which is about keeping a safe distance between people. Social

distancing is an important public health measure which reduces social interaction between people based on touch or physical proximity.[20] The virus mainly spreads during breathing, coughing, talking or sneezing through droplet contamination. To stop the spread of COVID-19, the person should avoid close contact with anyone who does not live with them. Social distancing is a critical measure for the slowing the rapidly spreading COVID-19 pandemic. Social distancing should be maintained by at least six feet from one person to other. Social distancing should be practiced rigorously for minimizing the spread of the COVID-19 infection. It is safe to avoid crowded places and social gathering for maintain proper social distancing as it is difficult to maintain six feet distance from other person. However, a high compliance is required for getting maximum impact which may not be easily achievable. Even at the time of lockdown, person to person contacts in supermarkets or medical care, many citizens were not obeyed properly. As several people are moving constantly, the SARS-CoV-2 can be easily picked up when social distancing is not rigorously practiced. This makes the virus back into the home and workplace and lead to community spread of the virus easily. Individuals more than 70 years of age should strictly practice social distancing meaning they must maintain a two-meter distance from other persons and avoid gatherings or congregations. [21] This social distancing measure is targeted to decrease the contacts by 50% at the workplace and reduce other contacts by 75%. [22] All individuals must practice social distancing to prevent the transmission of the viral infections from human to human. Non-essential use of the public transport should be avoided and the arrangement to work from the home. Person should use remote technology to keep in touch with family and friends, so that small and large gatherings can be avoided. Online services and telephone should be utilized for contacting health care professionals and other essential services. [23] The power of social distancing should be properly understood by the public and health care professionals. The power of the social distancing is given in (Table 1). [24]

TABLE 1: POWER OF THE SOCIAL DISTANCING AND RATE OF COVID-19 INFECTION

NOW	5 DAYS	30DAYS
1 person	2.5 persons are infected	406 persons are infected
50% LESS EXPOSURE	5 DAYS	30DAYS
1 person	1.25 persons are infected	15 persons are infected

75% LESS EXPOSURE	5 DAYS	30DAYS
1 person	1 person is infected	3 persons are infected

HAND HYGIENE

Hand hygiene is an important element for prevention of the transmission of the viral infection. The literature showed that frequent hand washing would minimize the risk of viral transmission by 55%. [25] Appropriate hand washing can break the transmission cycle of the virus and reduce the risk of infection between 6% to 44%. [26] The behaviors of hand hygiene in COVID-19 pandemic reflect the global issue and its presentation. There should be feedback for monitoring hand hygiene and this should be monitored properly. However, there are still some inadequacies. In line with the WHO recommendation, hand washing should be done thoroughly, including for inter-digital web spaces, wrists and finger nails for at least 20 seconds with soap and water. Frequent hand washing causes prolonged exposure to water and chemical or physical agents which lead to several pathophysiologic changes with epidermal barrier disruption of the hand. Hand hygiene products are available in different types such as bar or liquid soaps, synthetic detergents, antiseptic hand washes and alcohol-based hand sanitizers (ABHSs). These work by penetrating into the viral membrane to denature and coagulate the proteins, disruption of the cellular metabolism and enhances the lyses' of the viral particles. [27] For health care workers, hands must be washed before and after encountering patients with the use of ABHS and antiseptics with antiviral activity. [28] Each formulation is usually effective against COVID-19 infection but these may alter the skin barrier integrity and functional aspect, leading to the chance of the hand dermatitis. The alteration in the skin of the hand due to excessive hand washing may cause dryness of the skin and even contact dermatitis. Wet work and synthetic detergents are often contributors in causing hand dermatitis because of the inclusion of the preservative, surfactant and fragrance allergens. A mixture of the chemical and physical irritants e.g., detergents and hot water leads to release of pro-inflammatory cytokines from keratinocytes which instigate the disruption of the skin barriers of the hands. The documented irritants are detergents, iodophors, chlorhexidine, triclosan and alcohol-based products. Methods for avoiding hand dermatitis include devoid of common allergens and use of moisturizers. Individuals with recalcitrant hand dermatitis

should be properly evaluated and treated by a dermatologist. These manifestations of the skin can be managed by applying moisturizer immediately after hand washing. The proper technique of rinsing of the hands should be done gently to prevent physical irritation of the skin. Regular skin hydration is the key point for preventing the dermatitis on the hand as a consequence of the frequent hand washing. These hydrating products should be applied liberally, several times per day, specifically after washing hand. In case of person with highly sensitive skin which easily develop dermatitis, short course of topical corticosteroids can be used to minimize the signs and symptoms of the inflammations of the skin. Those are wearing protective gloves; it is recommended to wash the hands and use moisturizers whenever gloves are removed. Awareness about adverse effects for hand washing should be promoted such as to avoiding excessive hand washing, prolonged surgical scrubbing and prolonged use of gloves. [29]

WEARING MASK

Face mask use by the general population for preventing the spread of the COVID-19 infection is controversial, though increasingly recommended. Mass uses of face masks for healthy individuals in the community were not recommended by the WHO to prevent the SARS-CoV-2 virus in its interim guidance of April 6, 2020. [30] Public Health England (PHE) had not recommended same as WHO, but Centers for Disease Control and Prevention (CDC) advised for wearing cloth masks in public places. [31] After this, several countries accepted mass mask use in public spaces. Mass use of the face mask is useful for the daily workers those cannot stay at home. As daily workers return to work, mass use of the face mask might be helpful to reduce the transmission of the SARS-CoV-2 virus. The exact pathophysiology of the COVID-19 is still unclear, and the droplet and contact transmission are thought to be important route. Wearing face mask is a simple method to prevent the transmission of the virus which reduces the spread of the disease. [32] Use of face mask prohibits pathogens from entering into the respiratory airway which will cut the droplet transmission route directly. Face masks will purify the air entering into lungs by filtration of inspiratory

air. Currently, few western countries oppose mask wearing by general community members, however, the experience from China and South Korea showed that use of face masks are a effective protective measure. There are several types of the masks available such as medical or homemade masks for general public and N95 masks for the health care workers. N95 masks can filter 95% or tinier 0.3 μ m particles. Use of N95 masks and surgical masks can separately block 91% and 68% pathogens respectively. [25] Cloth masks usually filter viral particles at the time of coughing with 50 to 100% filtration efficiency of surgical masks. [33] Properly fitted face masks play an important role for prevention of the infection in youth persons. One study showed that approximately 32.47% of the primary school children used properly fitted masks. [34] Mass mask wearing is helpful to control the source of the infection and considered as low-cost adjunct in relation to the social distancing and hand washing in COVID-19 pandemic. So, the mass mask wearing is a symbol of social solidarity during the global response to the COVID-19 pandemic. More than 100 countries, including India, have guidelines for people to wear face mask when they leave their home as preventive measures against COVID-19 infection. Several countries like Japan, Singapore and Hong Kong adopted the mandatory use of the face mask at initial phases of the COVID-19 outbreak, resulting in low mortality rates. Thus, wearing face masks in public space will stop the spread of the virus. Such preventive measures are helpful to reduce the spread of the infection in a large population. So, use of the face mask in the public space is an important health measure and now wearing face mask is called a new normal after COVID-19 pandemic.

CONCLUSION

Currently there is a challenge to break the chain of the human transmission of COVID-19 infection. There should be continuous monitoring, tracing of the COVID-19 patients and strict adherence to the universal precautions for preventing such a dreaded pandemic. Social distancing, hand washing and wearing face masks are inexpensive and widely acceptable options for the prevention of the COVID-19 infection. These should be strict and effective ways for controlling this current COVID-19 pandemic. Social distancing, hand hygiene and wearing face masks contributed not only to preventing current COVID-19 infections but also help to reduce further waves of the COVID-19 infection and other respiratory infections.

References

1. Swain SK, Agrawal R. Mastoid surgery: a high-risk aerosol generating surgical procedure in COVID-19 pandemic. *International Journal of Otorhinolaryngological and Head and Neck Surgery* 2020;6(10):1941.
2. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? *Lancet* 2020;395:1225-1228.
3. Swain SK, Behera IC. Managing pediatric otorhinolaryngology patients in coronavirus disease-19 pandemic-A real challenge to the clinicians. *Indian J Child Health* 2020;7(9):357-362.
4. Di Gennaro F, Pizzol D, Marotta C, Antunes M, Racalbutto V, Veronese N, et al. Coronavirus diseases (COVID-19) current status and future perspectives: a narrative review. *International journal of environmental research and public health* 2020;17(8):2690.
5. Swain SK, Acharya S, Sahajan N. Otorhinolaryngological manifestations in COVID-19 infections: An early indicator for isolating the positive cases. *J Sci Soc* 2020; 47:63-68.
6. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020;323:1239-1242.
7. Coronavirus disease 2019 (COVID-19) Situation Report –66. World Health Organization. March 26, 2020 https://www.who.int/docs/defaultsource/coronaviruse/situation-reports/20200326-sitrep-66-covid-19.pdf?sfvrsn=81b94e61_2 March 27, 2020.
8. WHO. Situation report – 182. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200720-covid-19-sitrep-182.pdf?sfvrsn=60aabc5c_2. Accessed 21 July 2020.
9. WHO. Rolling updates on coronavirus disease (COVID-19) <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>. Accessed 15 July 2020.
10. McIntosh K, Hirsch MS, Bloom A. Coronavirus disease 2019 (COVID-19): pidemiology, virology, and prevention. *Lancet Infect Dis* 2020; 1:2019-2020.

11. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med* 2020;382(8):727-733.
12. He F, Deng Y, Li W. Coronavirus disease 2019: What we know? *Journal of medical virology* 2020;92(7):719-725.
13. Bai Y, Yao L, Wei T, Tian F, Jin DY, Chen L, Wang M. Presumed asymptomatic carrier transmission of COVID-19. *JAMA* 2020;323(14):1406-1407.
14. Zhang W, Du RH, Li B, Zheng XS, Yang XL, Hu B, et al. Molecular and serological investigation of 2019-nCoV infected patients: implication of multiple shedding routes. *Emerging Microbes & Infections* 2020;9(1):386-389.
15. Jones NR, Qureshi ZU, Temple RJ, Larwood JP, Greenhalgh T, Bourouiba L. Two metres or one: what is the evidence for physical distancing in covid-19?. *BMJ* 2020 Aug 25;370.
16. Xie Y, Wang Z, Liao H, Marley G, Wu D, Tang W. Epidemiologic, clinical, and laboratory findings of the COVID-19 in the current pandemic: systematic review and meta-analysis. *BMC infectious Diseases* 2020;20(1):1-2.
17. Zhejiang University School of Medicine: Handbook of COVID-19 Pre-vention and Treatment, 18/03/2020.2.
18. Swain SK, Das S, Padhy RN. Performing tracheostomy in intensive care unit-A challenge during COVID-19 pandemic. *Siriraj Medical Journal* 2020;72(5):436-442.
19. Ma QX, Shan H, Zhang HL, Li GM, Yang RM, Chen JM. Potential utilities of mask-wearing and instant hand hygiene for fighting SARS-CoV-2. *J Med Virol* 2020; 31:10.1002/jmv.25805. doi: 10.1002/jmv.25805. Epub ahead of print. PMID: 32232986; PMCID: PMC7228401.
20. Mishra M, Majumdar P. Social Distancing During COVID-19: Will it Change the Indian Society? *Journal of Health Management* 2020;22(2):224-235.
21. Tom Inglesby answers your COVID-19 questions, [Internet]. [cited 2020 Mar 29]. Available from: <https://html5-player.libsyn.com/embed/episode/id/13526585/height/90/theme/custom/thumbnail/yes/direction/forward/render-playlist/no/custom-color/ea5329/>.
22. Ferguson NM, Laydon D, Nedjati-Gilani G, Imai N, Ainslie K, Baguelin M. vol. 20. 2020. (Impact of Non-pharmaceutical Interventions (NPIs) to Reduce COVID- 19 Mortality and Healthcare Demand)
23. Guidance on social distancing for everyone in the UK. <https://www.gov.uk/government/publications/covid-19-guidance-on-social-distancing-and-for-vulnerable-people/guidance-on-social-distancing-for-everyone-in-the-uk-and-protecting-older-people-and-vulnerable-adults> [Internet], GOV.UK. [cited 2020 Mar 22].
24. Nicola M, O'Neill N, Sohrabi C, Khan M, Agha M, Agha R. Evidence based management guideline for the COVID-19 pandemic - Review article. *Int J Surg* 2020; 77:206-16.
25. Jefferson T, Del Mar CB, Dooley L, Ferroni E, Al-Ansary L, Bawazeer, et al. Physical interventions to interrupt or reduce the spread of respiratory viruses: Systematic review. *BMJ* 2009;339: 3675.
26. Rabie T, Curtis V. Handwashing and risk of respiratory infections: A quantitative systematic review. *Trop Med Int Health* 2006;11:258-267.
27. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. *J Hosp Infect* 2020;104(3):246-251.
28. World Health Organization. WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge: Clean Care Is Safer Care. World Health Organization; 2009.
29. Gasparini G, Carmisciano L, Giberti I, Murgioni F, Parodi A, Gallo R. "HEALTHY HANDS". A pilot study for the prevention of chronic hand eczema in healthcare workers of an Italian University Hospital. [Epub ahead of print]. *G Ital Dermatol Venereol*. 2019. <https://doi.org/10.23736/S0392-0488.19.06220-5>. Accessed June 12, 2019.
30. WHO. Advice on the use of masks in the context of COVID-19: interim guidance, April 6, 2020. [https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-outbreak](https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak) (accessed April 15, 2020).
31. US Centers for Disease Control and Prevention. Recommendation regarding the use of cloth face coverings, especially in areas of significant community-based transmission. April 3, 2020. <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html> (accessed April 15, 2020).

32. Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. *Lancet Respir Med* 2020;8(5):434-436.
33. Dugdale CM, Walensky RP. Filtration Efficiency, Effectiveness, and Availability of N95 Face Masks for COVID-19 Prevention. *JAMA Intern Med* Published online August 11, 2020.
doi:10.1001/jamainternmed.2020.4218
34. Chen X, Ran L, Liu Q, Hu Q, Du X, Tan X. Hand Hygiene, Mask-Wearing Behaviors and Its Associated Factors during the COVID-19 Epidemic: A Cross-Sectional Study among Primary School Students in Wuhan, China. *Int J Environ Res Public Health* 2020; 17(8):2893