Arruda, J Pharm Sci Emerg Drugs 2020, S:1
DOI: 10.37532/jpsed.2020.S(1).e004

Journal of Pharmaceutical Sciences & Emerging Drugs

Editorial

A SCITECHNOL JOURNAL

# Primary prevention from the Spreading COVID-19

**Maria A Arruda***

*Research Development Manager at University of Nottingham, Nottingham, Nottinghamshire, United Kingdom*

***Corresponding author:** Maria A Arruda, Research Development Manager at University of Nottingham, Nottingham, Nottinghamshire, United Kingdom; E-mail: Maria.Arruda@nottingham.ac.uk

**Received:** May 07, 2020, **Accepted:** May 23, 2020, **Published:** May 29, 2020

## Editorial

Always consult local infection prevention and control protocols; only basic principles are detailed here.Immediately isolate all suspected or confirmed cases in an area that is separate from other patients. Place patients in adequately ventilated single rooms if possible. When single rooms are not available, place all cases together in the same room and ensure there is at least 3 feet (1 meter) between patients.

Implement standard precautions at all times: Practice hand and respiratory hygiene, Give patients a medical mask to wear, Wear appropriate personal protective equipment, Practice safe waste management and environmental cleaning.

Implement additional contact and droplet precautions before entering a room where cases are admitted:Wear a medical mask, gloves, an appropriate gown, and eye/facial protection (e.g., goggles or a face shield), Use single-use or disposable equipment.

Implement airborne precautions when performing aerosol-generating procedures, including placing patients in a negative pressure room.Some countries and organizations recommend airborne precautions for any situation involving the care of a COVID-19 patient.

All specimens collected for laboratory investigations should be regarded as potentially infectious.Appropriate personal protective equipment gives healthcare workers a high level of protection against COVID-19. A cross-sectional study of 420 healthcare workers deployed to Wuhan with appropriate personal protective equipment tested negative for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on molecular and serologic testing when they returned home, despite all participants having direct contact with COVID-19 patients and performing at least one aerosol-generating procedure. Standard surgical masks are as effective as respirator masks for preventing infection of healthcare workers in outbreaks of viral respiratory illnesses such as influenza, but it is unknown whether this applies to COVID-19.

Telehealth for primary care physicians is important that primary care physicians avoid in-person assessment of patients with suspected COVID-19 in primary care when possible to avoid infection. Most patients can be managed remotely by telephone or video consultations.

**General prevention measures for the general public -**

People should be advised to

a) Wash hands often with soap and water for at least 20 seconds or an alcohol-based hand sanitizer (that contains at least 60% alcohol), especially after being in a public place, blowing their nose, or coughing/sneezing. Avoid touching the eyes, nose, and mouth with unwashed hands,

b) Avoid close contact with people (i.e., maintain a distance of at least 3 feet [1 meter]) including shaking hands, particularly those who are sick, have a fever, or are coughing or sneezing. Avoid going to crowded places. It is important to note that recommended distances differ between countries (for example, 6 feet [2 meters] is recommended in the US and UK) and you should consult local guidance. However, there is no evidence to support a distance of 6 feet (2 meters),

c) Practice respiratory hygiene (i.e., cover mouth and nose when coughing or sneezing, discard tissue immediately in a closed bin, and wash hands),

d) Seek medical care early if they have a fever, cough, and difficulty breathing, and share their previous travel and contact history (travelers or suspected/confirmed cases) with their healthcare provider,

e) Stay at home and self-isolate if they are sick, even with mild symptoms, until they recover (except to get medical care),

f) Clean and disinfect frequently touched surfaces daily (e.g., light switches, door knobs, countertops, handles, phones).

Face masks for the general public

Recommendations on the use of face masks in community settings vary between countries. It is mandatory to wear a mask in public in certain countries or in certain situations, and masks may be worn in some countries according to local cultural habits. Consult local guidance for more information. There is no high-quality or direct scientific evidence to support the widespread use of masks by healthy people in the community setting, and there are risks and benefits that must be considered. Evidence for mask effectiveness for respiratory tract infection prevention is stronger in healthcare settings compared with community settings; direct evidence on comparative effectiveness in SARS-CoV-2 infection is lacking.The World Health Organization (WHO) recommends that people with symptoms of COVID-19 should wear a medical mask, self-isolate, and seek medical advice as soon as possible. The WHO also now encourages the general public to wear medical or cloth masks in specific situations and settings (e.g., areas with known or suspected widespread transmission and limited or no capacity to implement other containment measures such as social distancing, contact tracing, and testing; settings where social distancing cannot be achieved, particularly in vulnerable populations). This recommendation is based on observational evidence only.The Centers for Disease Control and Prevention (CDC) recommends that homemade cloth face coverings can be worn in public settings where social distancing measures are difficult to maintain (e.g., pharmacies, grocery stores), especially in areas where there is significant community transmission.Use of a mask alone is insufficient to provide adequate protection, and they should be used in conjunction with other infection prevention and control measures such as frequent hand hygiene and social distancing. It is important to wash your hands with soap and water (or an alcohol-based sanitizer) prior to putting on a face mask, and to remove it correctly. Used masks should be disposed of properly.Potential harms and disadvantages of wearing masks include: potential increased risk of self-contamination due to manipulation of face mask and touching face/eyes, or when nonmedical masks are not changed when wet or soiled; headache and/or breathing difficulties; facial skin lesions, irritant dermatitis, or

*doi: 10.37532/jpsed.2020.S(1).e004*

worsening acne; discomfort; difficulty communicating; false sense of security; poor compliance; waste management issues; and difficulties for patients with chronic respiratory conditions or breathing problems. Masks may also create a humid habitat where the virus can remain active and this may increase viral load in the respiratory tract; deeper breathing caused by wearing a mask may push the virus deeper into the lungs.In a study comparing the use of cloth masks to surgical masks in healthcare workers, the rates of all infection outcomes were highest in the cloth mask arm, with the rate of influenza-like illness statistically significantly higher in this group. Moisture retention, reuse of cloth masks, and poor filtration may result in increased risk of infection. The filtration, fit, effectiveness, and performance of cloth masks are inferior to medical masks and respirators. Protection may be improved by selecting appropriate material, increasing the number of mask layers, and using masks with a design that provides filtration and fit.

Alcohol-based hand sanitizers

The CDC has issued a warning about alcohol-based sanitizers containing methanol (which may be labeled as containing ethanol). Methanol poisoning should be considered in patients who present with relevant signs and symptoms (e.g., headache, impaired vision, nausea/vomiting, abdominal pain, loss of coordination, decreased level of consciousness) who report ingestion of hand sanitizer or frequent repeated topical use. Cases of permanent blindness and death have been reported.Frequent use of hand sanitizers may result in antimicrobial resistance. Accidental ingestion, especially by children, has been reported.

Screening and quarantine

People traveling from areas with a high risk of infection may be screened using questionnaires about their travel, contact with ill persons, symptoms of infection, and/or measurement of their temperature. Combined screening of airline passengers on exit from an affected area and on arrival elsewhere has been relatively ineffective when used for other infections such as Ebola virus infection, and has been modeled to miss up to 50% of cases of COVID-19, particularly those with no symptoms during the incubation period. Symptom-based screening processes have been reported to be ineffective in detecting SARS-CoV-2 infection in a small number of patients who were later found to have evidence of SARS-CoV-2 in a throat swab.Enforced quarantine is being used to isolate easily identifiable cohorts of people at potential risk of recent exposure (e.g., groups evacuated by aeroplane from affected areas, people returning to their home countries before border closures, or groups on cruise ships with infected people on board). The psychosocial effects of enforced quarantine may have long-lasting repercussions. Despite limited evidence, a Cochrane review found quarantine to be important in reducing the number of people infected and deaths, especially when started earlier and when used in combination with other prevention and control measures.

Social distancing

Many countries have implemented mandatory social distancing measures in order to reduce and delay transmission (e.g., city lockdowns, stay-at-home orders, curfews, nonessential business closures, bans on gatherings, school and university closures, travel restrictions and bans, remote working, quarantine of exposed people/travelers).Although the evidence for social distancing for COVID-19 is limited, it is emerging, and the best available evidence appears to support social distancing measures to reduce the transmission and delay spread. The timing and duration of these measures appears to be critical.Researchers in Singapore found that social distancing measures (isolation of infected individuals and family quarantine, school closures, and workplace distancing) significantly decreased the number of infections in simulation models.

Shielding extremely vulnerable people

Shielding is a measure used to protect vulnerable people (including children) who are at very high risk of severe illness from COVID-19 because they have an underlying health condition. Shielding involves minimizing all interactions between those who are extremely vulnerable and other people to protect them from coming into contact with the virus.

Extremely vulnerable groups include:Solid organ transplant recipients, People with specific cancers, People with severe respiratory conditions (e.g., cystic fibrosis, severe asthma, or severe COPD), People with rare diseases that significantly increase the risk of infections (e.g., sickle cell anemia, severe combined immunodeficiency), People on immunosuppression therapies sufficient to significantly increase the risk of infection, Women who are pregnant with significant heart disease (congenital or acquired), Other people who have also been classed as clinically extremely vulnerable based on clinical judgment and an assessment of their needs.

The UK government recommended shielding for certain groups of people until 31 July, and paused shielding from 1 August. Shielding recommendations may be necessary again if community transmission begins to rise significantly. The easing of shielding restrictions does not apply to extremely vulnerable people living in areas that are under local lockdown.Consult current guidance for specific recommendations (recommendations may differ between countries).Shielding advice for children and young adults is available. Shielding of clinically extremely vulnerable children and young people is not currently recommended in the UK. Consult current guidance for specific recommendations (recommendations may differ between countries).

Vaccines

Vaccines are in development, but it may take at least 12 to 18 months before one is available. According to news reports, a vaccine has been approved in Russia; however, it appears to have not completed large-scale clinical trials including phase 3 trials. Several vaccine candidates are currently approved for human testing through clinical trials, including mRNA and DNA platform vaccines, adenovirus vector vaccines, and inactivated virus vaccines.Previous trials of coronavirus vaccines identified cellular immunopathology and antibody-dependent enhancement (ADE) as potential safety issues, so there are concerns over ADE of SARS-CoV-2 due to prior exposure to other coronaviruses (such as those that cause the common cold).Results from preliminary animal and human studies are now available, but scientists urge caution over the results.Ad5-nCoV: a recombinant adenovirus type-5 (Ad5) vectored vaccine expressing the SARS-CoV-2 spike glycoprotein. Results from a single-center, open-label, nonrandomized, dose-escalation phase 1 trial in China report that the vaccine was immunogenic, inducing humoral responses (peaking 28 days after vaccination) and T-cell responses (peaking 14 days after vaccination) in most participants. Participants were healthy and had no underlying diseases. At least one adverse reaction was reported within the first 7 days after vaccination in 83% (low- and medium-dose groups) and 75% (high-dose group) of participants. The most common adverse reactions reported included injection-site

*doi: 10.37532/jpsed.2020.S(1).e004*

reactions, fever, fatigue, headache, and muscle pain. No serious adverse events were noted within 28 days of vaccination. A phase 2 randomized, double-blind, placebo-controlled trial in around 500 healthy adults (50% male, mean age 39 years) found that the vaccine induced a significant immune response in the majority of patients after a single dose of either the $1x10^{11}$ or the $5x10^{10}$ viral particle dose at day 28. Adverse reactions were significantly higher in the Ad5-nCoV group compared with placebo, and were reported in 72% of participants in the $1x10^{11}$ viral particle dose group and 74% of participants in the $5x10^{10}$ viral particle dose group.ChAdOx1 nCoV-19: an adenovirus vector vaccine that carries the SARS-CoV-2 spike protein. Preliminary results (not peer reviewed) from animal studies found that a single dose induced a humoral and cellular response in mice and rhesus macaques. However, while viral loads in bronchoalveolar lavage fluid and lung tissues of vaccinated animals were significantly reduced compared with unvaccinated animals, reduction in viral shedding from the nose was not observed.A phase 1/2, single-blind, randomized controlled trial in young healthy volunteers that used the meningococcal conjugate vaccine as a control found that ChAdOx1 nCoV-19 was immunogenic. Local and systemic reactions were more common in the ChAdOx1 nCoV-19 group and no serious adverse events were reported in the 28 days following vaccination.Inactivated SARS-CoV-2 virus : contains a more traditional chemically inactivated version of the virus. The vaccine was found to induce immunity in mice, rats, and nonhuman primates. When challenged with the virus, monkeys who were vaccinated with the highest dose of the vaccine did not develop infection, and no virus was recovered from the throat, lung, or rectum. In an interim analysis of two ongoing randomized controlled trials in healthy adults ages 18 to 59 years, a phase 1 trial of 96 participants and a phase 2 trial of 224 participants, the vaccine induced a neutralizing antibody response by 14 days. The studies compared the vaccine with an alum adjuvant. The incidence of adverse effects across all participants within 7 days of injection was 15%, most commonly injection-site reactions and fever. Although the vaccine elicited an antibody response, it is unknown whether this could protect individuals against COVID-19.mRNA-1273: a novel vaccine that uses mRNA technology not previously approved for use in humans. The mRNA encodes for a full-length prefusion stabilized spike protein of SARS-CoV-2 and is encapsulated in a lipid nanoparticle. Results from a phase 1 trial indicated that all 45 healthy adults (ages 18-55 years) who were given 2 injections (25, 100, or 250 micrograms) of the vaccine 28 days apart seroconverted by day 15 after the first dose. All dose groups had antibody levels in the top quartile for convalescent serum after the second vaccination. Systemic adverse events occurred more frequently after the second vaccination and occurred in 54% of participants in the 25-microgram group, and 100% of participants in the 100-microgram and 250-microgram groups. Of the cohort of 14 patients who received the highest dose (250 micrograms), 21% of participants experienced one or more severe adverse events following the second dose. One participant in the 25-microgram group was withdrawn due to transient urticaria related to the first vaccination. The study did not include people with underlying conditions. mRNA-1273 has been granted fast-track designation by the Food and Drug Administration (FDA), and phase 3 trials have started.BNT162b1: a lipid nanoparticle-formulated, nucleoside-modified, mRNA vaccine that encodes spike glycoprotein RBD. Preliminary (not peer reviewed) phase 1/2 study results in healthy adults ages 18 to 55 years have been published. RBD-binding immunoglobulin G antibodies and SARS-CoV-2 neutralizing antibodies were detected in all subjects at 28 days after two doses. Adverse reactions were dose-dependent and reported in 50% of subjects who received the 10 microgram or 30 microgram dose, and by 58% of subjects who received the 100 microgram dose. BNT162b1 and BNT162b2 (its related vaccine candidate) have been granted fast-track designation by the FDA. A global phase 2/3 trial of BNT162b2 has started.Results from other vaccine candidates are becoming available; however, a detailed discussion of all vaccine candidates is beyond the scope of this topic.The FDA has issued guidance to vaccine developers that in order for it to approve a vaccine candidate the primary efficacy end-point point estimate for a placebo-controlled efficacy trial should be at least 50%, and the statistical success criterion should be that the lower bound of the appropriately alpha-adjusted confidence interval around the primary efficacy end-point point estimate is >30%.

Immunity passports

Some governments are discussing or implementing certifications for people who have contracted and recovered from COVID-19 based on antibody tests (sometimes called "immunity passports"). Possession of a passport would allow people to have a greater range of privileges (e.g., work, education, travel). However, the WHO does not support these certifications as there is currently no evidence that people who have recovered from infection and have antibodies are protected from reinfection. Other potential issues include lack of public support for these measures, potential for discrimination of groups of people, testing errors (including cross-reactivity with other human coronaviruses), access to testing, fraud, legal and ethical objections, and people getting infected intentionally in order to obtain a certification.

Smoking cessation

Past or current smokers have nearly double the risk for severe disease, and smoking cessation should be encouraged. The WHO recommends that tobacco users stop using tobacco given the well-established harms associated with tobacco use and second-hand smoke exposure. Public Health England also recommends stopping smoking.