

Guidelines for the use of non-pharmaceutical measures to delay and mitigate the impact of 2019-nCoV

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Scope of this document

This document provides guidance on the application of non-pharmaceutical countermeasures to minimise the spread of the 2019 novel coronavirus (2019-nCoV) in the population. Some of the measures proposed refer specifically to certain phases of the epidemic (containment or mitigation phases), and can be adapted depending on the assessed severity/impact of the infection. Other measures are valid for all phases of an epidemic.

The guidance is based on the current knowledge of the 2019-nCoV and evidence available on other viral respiratory pathogens, mainly the Severe Acute Respiratory Syndrome coronavirus (SARS-CoV), the Middle East Respiratory Syndrome-related coronavirus (MERS-CoV) and seasonal or pandemic influenza viruses.

ECDC will update this guidance as and when new relevant information becomes available or as required by the epidemiological situation.

Target audience

Public health authorities in the EU/EEA Member States (MS) and the UK.

Background

Since it was first identified in Wuhan, Hubei province, thousands of cases of the 2019-novel coronavirus (2019-nCoV) infection have been reported in China. Several cases have also been reported in other countries across the continents of Asia, Europe, America, and Oceania, either as imported cases from China or as result of autochthonous transmission.

Coronaviruses are usually transmitted by direct contact through large respiratory droplets, but other modes of transmission have been identified. To date, human-to-human transmission through direct contact is the most common transmission mode for 2019-nCoV [1]. Although there is no evidence of airborne transmission, a precautionary approach is recommended due to uncertainties surrounding the potential for aerosol-mediated transmission of the virus. Other routes of transmission, such as contact with contaminated fomites and inhalation of aerosols during aerosol-generating procedures, may have occurred in some cases [2]. The RNA of the virus has been detected in the faeces of a confirmed patient with gastrointestinal symptoms, hence faecal-oral transmission cannot be ruled out [3]. The current estimated basic reproductive number (R_0) is 2.2 (95% CI, 1.4 to 3.9) [4].

This document is based on an ECDC Expert Opinion on non-pharmaceutical countermeasures currently under development for use against pandemic influenza. Since there are uncertainties concerning the infectious period of the 2019-nCoV and its R_0 and how these differ from influenza [4,5], this document should be interpreted with caution. However, it is plausible that measures effective against influenza would also work against 2019-nCoV. The primary objective of non-pharmaceutical countermeasures is to reduce the impact of an outbreak by reducing the number of contacts that result in disease transmission. Depending on the extent to which they are implemented, non-pharmaceutical countermeasures can delay the time to epidemic peak and reduce the overall number of cases,

the number of cases at epidemic peak, and the total number of severe cases and deaths. Reducing the number of cases during the epidemic peak and the subsequent spread of cases over a longer time-period would play a crucial role in reducing the burden on the healthcare and other sectors, thus allowing more effective treatment of infected patients. This is an important goal of the current 2019-nCoV containment strategy in Europe (i.e. to delay the possible spread of 2019-nCoV until the end of the ongoing influenza season, hence reducing the strain on healthcare systems). Furthermore, delaying the introduction of 2019-nCoV into Europe would allow for more surge capacity in public health and healthcare services (including laboratories) while also minimising the need for differential diagnoses. Finally, this would also gain time for the development, production and distribution of effective and safe pharmaceuticals (i.e. vaccines and antiviral drugs).

Non-pharmaceutical countermeasures may be implemented at all stages of an epidemic but the choice of the most suitable measures may differ during the containment and mitigation phases. These measures range from standard precautions, such as hand, respiratory and environmental hygiene, in the form of personal protective action taken by individuals, to actions requiring the engagement of communities and the involvement of local, regional or national authorities (i.e. social distancing and travel-related measures).

Therefore, one of the key factors for the effective application of non-pharmaceutical measures is the correct identification and definition of triggers for their activation/deactivation during the various epidemic phases (e.g. school closures or travel restrictions). Non-pharmaceutical measures should ideally be combined with other approaches, as individual measures may not be so effective when implemented alone [6,7]. In the early epidemic phases, a combined approach may contain the pathogen or delay its spread, thus allowing for unaffected areas to activate their preventive measures in the meantime. During a widespread epidemic, a synergistic effect may increase the effectiveness of individual non-pharmaceutical measures and mitigate the disease impact, whilst reducing costs to society and the economy [7]. Despite the anticipated effectiveness of each measure, non-pharmaceutical countermeasures need to be evaluated in terms of their necessity, acceptability and feasibility. National planning and public health action should therefore be tailored to the severity and impact of the epidemic and to the local epidemiological situation. EU decision no 1082/2013/EU on serious cross-border threats to health regulates the risk assessment, communication and coordination of responses in situations such as the current spread of 2019-nCoV, and ensures that EU/EEA Member States take risk management measures in consultation with one another and the European Commission (EC).

Personal protective measures

Personal protective measures refer to hand and respiratory hygiene, cough etiquette and use of respirators or facemasks.

Hand hygiene

The risk of transmitting or acquiring 2019-nCoV infection can be reduced by the correct application of hand hygiene. Hand hygiene refers to the frequent washing of hands with soap and water or cleaning of hands with alcoholic solutions, gels or tissues. Hands should be washed regularly using soap and water for 20–40 seconds [8]. Alcohol-based hand sanitisers provide limited added benefit over soap and water in community settings, and if used should contain 60–85% alcohol [8,9]. If hands are soiled, soap and water should precede the use of alcohol-based hand sanitisers. Since the 2019-nCoV virus can be transmitted by direct contact through droplets or indirectly through hand-mediated transfer of respiratory or possibly other secretions, we recommend applying hand-hygiene measures in all community settings (home, schools, workplaces, etc.) during all phases of the epidemic. Proper hand hygiene would also prevent the transmission of other communicable diseases.

In healthcare settings, proper hand hygiene will need to be performed immediately before and after contact with a patient, before wearing or removing personal protective equipment (PPE) and after contact with potentially infectious material, such as respiratory or other secretions. The same applies to patients or people caring for patients at home.

Recommending hand hygiene is considered to be a rational precaution, involving limited costs and no significant associated risks. Its effectiveness is likely to increase in combination with other measures (e.g. facemasks used in healthcare settings). The effectiveness of hand hygiene depends on the ability to ensure that people comply, through appropriate and repeated training and an adequate and regular supply of soap, tissues and alcohol-based hand sanitisers.

Cough etiquette

Cough etiquette refers to covering the mouth and nose when coughing and sneezing (e.g. using a paper tissue or cloth handkerchief) with the aim of reducing person-to-person transmission through droplets which are a known mode of transmission for coronaviruses.

Cough etiquette is widely recommended in public health guidelines for all community settings (home, schools, workplaces, healthcare settings, etc.) at all times. Supply of materials (e.g. tissues, no-touch waste bins, etc.)

needs to be ensured. It is important that tissues are properly disposed of immediately after the use and hands are then washed with soap and water, as described in the hand hygiene section of this document.

Facemasks and respirators

This measure refers to the use of facemasks or respirators. For optimal use of these non-pharmaceutical countermeasures, it is important to have a sound estimate of the duration of the infectious period - which is not as yet available for 2019-nCoV infection.

Facemasks range from simple, even homemade masks, to cloth and surgical (medical) masks. They vary in thickness and permeability. They can protect against larger respiratory droplets but are not guaranteed to protect users from airborne infection. Cloth/gauze masks may induce moisture retention and poor filtration and it is unclear whether they confer clinical protection [10].

Respirators are specifically designed to protect users from small airborne particles, including aerosols [11,12]. They are usually available in three sizes (small, medium or large) to allow for differences in face contours. European standard (EN 149:2001+A1:2009) defines classes for respirators entirely or substantially constructed of filtering material [filtering face pieces (FFP) 1-3] [10]. Because the various respirators fit users differently, they need to be fitted individually in order to match each user with the appropriate respirator.

Surgical masks or respirators should be changed frequently in order to maintain their effectiveness. The frequency of change depends on several factors. As a general rule, a mask should be changed as soon as it becomes moist and, in healthcare settings, whenever moving from one patient to another.

Use of facemasks and respirators in healthcare settings

In healthcare settings, facemasks or respirators are used to reduce transmission and protect healthcare workers, patients and visitors against infection. Suspected 2019-nCoV cases should be offered a surgical mask which they should wear correctly while in public areas or while visiting areas where other people are present. Suspected cases arriving in healthcare settings should, where possible, immediately be offered a surgical mask in order to mitigate the risk of droplet spread when in triage or waiting areas or during transportation within the facility.

During the assessment of a suspected case or the management of a confirmed case, healthcare workers should use FFP respirators class 2 or 3 (FFP2 or FFP3) which protect both from droplet and aerosol transmission. In the absence of FFP respirators, a surgical mask should be worn that protects from droplet transmission. It is recommended that healthcare workers performing procedures that are likely generate aerosol should wear an FFP3 respirator. If FFP2 or FFP3 respirators are not available, the use of a surgical facemask is recommended. When using this type of PPE, the limitations and risks connected to its use should be assessed on a case-by-case basis.

Proper mask disposal and combined measures (e.g. proper hand hygiene) will probably increase the effectiveness of individual measures. For more information please consult the ECDC [document](#) on 'Infection prevention and control for the care of patients with 2019-nCoV in healthcare settings' [13]. ECDC has also published an [adaptable template leaflet](#) providing advice to healthcare workers on handling and caring for patients.

Use of facemasks in other high-exposure situations

It is still unclear whether the use of surgical facemasks by healthy people who might be exposed to 2019-nCoV will be beneficial. This uncertainty is mainly due to the low filtration efficiency of surgical masks, the risk of infection due to inappropriate use of the mask in high-risk community settings and the false sense of security offered by wearing a mask.

The following groups at risk of high-exposure could consider the use of surgical masks:

- care-providers for symptomatic suspected 2019-nCoV cases (before their hospitalisation);
- people in occupations who have extensive face-to-face contact with the public where there is ongoing transmission.

Furthermore, the wearing of a surgical mask can be considered for groups at risk of developing severe complications if infected (e.g. individuals in older age groups or having underlying conditions).

Relevant documents for the management of cases on ships and aircraft have been published by EU Healthy Gateways Joint Action: '[Interim advice for preparedness and response to cases of the 2019-nCoV acute respiratory disease at points of entry in the European Union \(EU\)/EEA Member States](#)' [14]. Proper use and disposal of masks and proper hand hygiene need to be ensured by training users before distributing masks.

Use of facemasks in community settings

Surgical masks may be used as an infection control measure or as a mitigation measure in community settings when worn by individuals with respiratory symptoms before seeking medical advice and while being assessed. In the event that a symptomatic person cannot wear a facemask, close contacts should consider wearing one instead. During the containment phase, suspected cases can be offered a facemask as a precautionary measure.

There is no evidence on the usefulness of facemasks worn by persons who are not ill as a community mitigation measure. In the EU, it is not customary for health people to wear masks in the wider community. If masks are

used, best practices for should be followed donning, doffing, and disposing of them. The hand hygiene measures detailed above should always be followed after removing a mask.

Other personal protective equipment

Other personal protective equipment (PPE), such as eye protection (goggles, face shield or procedural masks), body protection (long-sleeved water-resistant gowns), and hand protection (gloves), should be used by healthcare workers or those caring for a patient or suspected 2019-nCoV case, especially when performing aerosol-generating procedures or when the risk of exposure to body secretions is high. Although the most common route of 2019-nCoV transmission is via respiratory droplets, it is not yet clear to what extent other secretions play a role. The use of PPE must be accompanied by appropriate training. Disposable PPE needs to be disinfected and disposed of immediately after use in accordance with routine safety procedures and used in combination with proper hand hygiene measures.

There are separate ECDC documents on '[Infection prevention and control for the care of patients with 2019-nCoV in health care settings](#)' [13] and '[Personal protective equipment \(PPE\) needs in healthcare settings for the care of patients with suspected or confirmed novel coronavirus \(2019-nCoV\)](#)' [15].

Environmental measures

Environmental measures refer to:

- routine cleaning of frequently used surfaces, clothes and objects;
- minimising the sharing of objects;
- ensuring appropriate ventilation.

These measures aim to enhance protection and reduce the risk of infection for 2019-nCoV and other communicable diseases in various settings (healthcare settings, long-term care facilities, educational settings, workplaces, public places and homes).

The survival time of 2019-nCoV in the environment is currently unknown. The survival of SARS-CoV is estimated to be several days and MERS-CoV >48 hours at an average room temperature (20°C) on different surfaces [16-18].

Although available evidence on the effectiveness of environmental measures in mitigating the impact of respiratory virus epidemics is limited, it is plausible that these measures may reduce viral transmission and, as such, it is recommended that they are used at all times and in all settings during the containment and mitigation phases of the epidemic [19]. Such measures include the routine cleaning of frequently used surfaces and objects (such as phones, tablets, doorknobs, toilets and keyboards) with water and detergent (such as bleach solution), washing laundry according to the detergent manufacturer's instructions at the warmest indicated temperature, and minimal sharing of objects (such as drinking glasses, eating utensils, towels and bed linen). Air ventilation in rooms is especially important in settings where people gather regularly. Lessons learnt from the SARS-CoV outbreaks show that it is possible for the virus to spread within a building through the mechanical ventilation system and therefore building maintenance measures should be taken into account [20].

In healthcare settings, it is especially important that thorough cleaning and disinfection is consistently performed. Cleaning with water, detergent and common hospital disinfectants should be sufficient, although there is lack of specific evidence for their effectiveness against 2019-nCoV virus. Routine safety procedures for disinfection and/or disposal of PPE, medical equipment, utensils, laundry and contaminated waste should be applied in case of 2019-nCoV suspected and confirmed cases. ECDC has published a document '[Interim guidance for environmental cleaning in non-healthcare facilities exposed to 2019-nCoV](#)' [21].

Social distancing measures

Quarantine or self-isolation of 2019-nCoV cases and contacts during the containment phase

Quarantine and self-isolation imply that a person should remain in a designated setting or at home for a defined period after exposure to a situation where transmission of 2019-nCoV virus may have occurred. Evidence relating to influenza pandemics indicates that quarantining exposed people may delay the peak of local epidemics during the early stages of an epidemic, thus helping to reduce the burden of disease and delay further spread [19]. Therefore, this option can be considered during the early stages of 2019-nCoV virus introduction into Europe, as part of the Member States' containment efforts. When implementing quarantine measures, Member States should be aware of the disadvantages and possible compliance issues in order to weigh these against expected benefits.

The duration of the quarantine depends on the estimated incubation period of the virus. Early estimates indicated that the mean incubation period for 2019-nCoV is 5.2 days (95% confidence interval [CI], 4.1 to 7.0), with the 95th percentile of the distribution at 12.5 days [22]. A duration of 14 days is therefore considered sufficient for

monitoring persons having had contact with 2019-nCoV cases [4]. These guidelines will be updated if new data reveals different incubation and infectious periods. Rapid identification of cases enhances the effectiveness of quarantine measures.

There are considerable logistical, social and communication challenges in implementing quarantine measures. Education on infection control using personal protective and environmental measures in the home or other quarantine setting would be necessary.

The efficiency and resources needed to implement quarantine or self-isolation are dependent on the definition and, in particular, the scale of exposure in the target population. The more specifically the exposure is defined and confined, the more feasible such a measure will be. Implementing quarantine measures for subsets of healthy populations with unclearly defined exposure is unlikely to be an efficient use of resources. ECDC's [contact management technical report](#) [23] should be used to assess the potential risk and plan the actions associated with visitors from [areas with presumed community transmission of 2019-nCoV](#). Quarantine is unlikely to be effective as soon as multiple introductions start to occur into EU/EEA countries and the UK from places other than China.

[Suspected, probable or confirmed cases of 2019-nCoV](#) should be reported to the public health authorities and managed in accordance with national guidance and/or [WHO's patient management guidelines](#). Contacts should be isolated and/or monitored in accordance with national guidance and/or ECDC's technical document '[Public health management of persons having had contact with novel coronavirus cases in the European Union](#)' [23]. This document classifies contacts as 'close' or 'casual' and proposes actions, including self-isolation of close contacts and self-monitoring of casual contacts. If symptoms of illness occur, the quarantined persons should then self-isolate and seek medical advice.

Voluntary isolation of symptomatic 2019-nCoV cases not requiring hospitalisation during mitigation phase

Self-isolation of individuals with symptoms of a respiratory infection is one of the most important measures for reducing disease transmission and limiting the spread of the virus in the community during an epidemic [19]. During a community mitigation phase, this measure refers to persons presenting with an acute respiratory infection and probable or confirmed 2019-nCoV virus infection, who do not need hospital care. These individuals would usually be requested to voluntarily remain at home or in a designated setting, in a single, dedicated, adequately ventilated room and preferably use a dedicated toilet while displaying symptoms or for a defined period of time. This recommendation will be revised if new information becomes available on the infectious period for 2019-nCoV.

Early identification of cases to ensure rapid isolation is of paramount importance to prevent further spreading of the virus in the community. Based on current knowledge of 2019-nCoV clinical presentation, the most commonly observed symptoms are fever, cough, myalgia, fatigue and other non-specific respiratory symptoms, similar to those for other respiratory virus infections. This makes clinical suspicion particularly challenging during the influenza season [24]. Fever has been the most commonly reported symptom for 2019-nCoV but this may not be present in some patients, such as the very young, elderly or immunocompromised persons [24]. A small number of patients have reported gastrointestinal symptoms (such as vomiting and diarrhoea) [3,24]. The effectiveness of voluntary isolation would be reduced if there were transmission via asymptomatic or pre-symptomatic cases.

A combination of personal protective and environmental measures during isolation will increase intervention effectiveness [19]. There are complicated logistical issues associated with this measure (e.g. food provision, medical supplies, medical care) and training and supplies will therefore be essential to ensure support and infection control (e.g. PPE, proper waste disposal) for household members caring for the person who is ill.

In the absence of strong evidence on the infectious period, it is not possible to make evidence-based recommendations for isolation by case classification or stage of infection. These guidelines assume that infectiousness coincides with the symptomatic period, which is currently a reasonable assumption. Suggested non-pharmaceutical measures for cases and contacts during the containment and mitigation phases are summarised in Table 1.

Table 1. Non-pharmaceutical measures during containment and mitigation phases: quarantine, self-isolation and self-monitoring of confirmed, probable and suspected cases and close or casual contacts**A. Containment phase**

Case	Suggested measure
Confirmed	Isolation (at home or in healthcare setting depending on clinical conditions) and monitoring by public health authorities in accordance with national guidance
Probable	Isolation (at home or in healthcare setting depending on clinical conditions) and monitoring by public health authorities in accordance with national guidance
Suspected	Immediate testing for 2019-nCoV and application of non-pharmaceutical measures throughout the process.
Contact of confirmed or probable case	
Close contacts	Isolation at home or in dedicated settings and active daily monitoring by public health authorities in accordance with national guidance ¹
Casual contacts	Self-monitoring - seek public health and medical assistance if symptoms develop.

B. Mitigation phase

Case	Suggested measure
Suspected	Contact local healthcare services for advice on clinical management and on the need for testing. Suspected cases with mild clinical symptoms may be advised to self-isolate at home or to limit social contacts for the duration of symptoms.
Confirmed (symptomatic)	Follow the recommendations from the healthcare service that made the diagnosis and adhere to national guidelines for dealing with confirmed cases during the mitigation phase.

Interventions in educational and child care settings

Schoolchildren and children attending day-care facilities are considered to be one of the main drivers of respiratory virus spread in the community. However, it is not yet known how much 2019-nCoV transmission will occur among children.

Proactive school and day care closures

Proactive closures refer to the early and planned closure of schools and day-care facilities to limit local virus transmission and spread at schools and into the community. School closures can be associated with significant costs to society and the economy.

During the containment phase, school closures are not justified. There are also no data to support informed decisions on proactive school closures in terms of their anticipated effectiveness in mitigating the 2019-nCoV epidemic, due to the unknown level of transmission of this virus among children.

Given that the influenza virus is circulating in the community during the ongoing influenza season across the EU/EEA, in order to reduce the burden on healthcare systems, proactive school closures may be considered if there is ongoing transmission of 2019-nCoV in an area. The decision concerning school closures and their optimal timing and duration would need to be carefully considered on a case-by-case basis. Bearing in mind the impact of school closure, the decision should weigh the expected impact of the epidemic against the adverse effects of such closures on the community.

Evidence originating from seasonal and pandemic influenza modelling studies have shown that proactive school closures before the peak of influenza virus activity have had a positive impact in reducing community transmission [19]. There will be a need to minimise contacts between children and the general population outside of schools to reduce opportunities for transmission. In the event of proactive school closures, plans for society in general and inter-sectorial collaboration should be considered to mitigate the significant secondary effects. Plans to help mitigate transmission within schools, while children continue to attend may include smaller school groups, physical distance of children in the class, promotion of other non-pharmaceutical countermeasures and outdoor classes. In the event of illness, voluntary isolation at home is advisable.

Reactive school and day-care closures

Reactive closures of schools may be necessary as a consequence of widespread virus transmission in the community and educational settings. Reactive school and day-care closures will probably not reduce the impact of the epidemic, but may be enforced, due to high absenteeism and operational issues, especially if the spread of 2019-nCoV coincides with the ongoing influenza season in an EU/EEA country. Communities therefore need to prepare for this eventuality and consider plans for society in general and the inter-sectorial collaboration needed to mitigate secondary effects. As with proactive school closures, the timing and duration of the closures will need to be carefully considered on a case-by-case basis.

¹ There is no evidence directly comparing the effectiveness and cost-effectiveness of self-isolation at home versus isolation in dedicated settings. In both instances, effectiveness is expected to depend on compliance with recommended behaviour and procedures.

Measures in the workplace

Based on studies on seasonal and pandemic influenza, measures at workplaces can be modestly effective in mitigating an epidemic and may be considered during the mitigation phase.

The 2019-nCoV can transmit from person-to-person at workplaces and in other public settings where people gather in contained spaces for long periods. Viral transmission may therefore be reduced by decreasing the frequency and length of social interactions and the physical contacts between individuals. However, there are still insufficient data available to assess the extent of 2019-nCoV transmission in these settings.

Workplace measures refer to a variety of actions to reduce the risk of transmission in the workplace and the community. These measures include: flexible working schedules/shifts for employees, the opportunity of distance working/teleworking, encouraging physical distancing measures within the workspace, increased use of email and teleconferences to reduce close contacts, reduced contact between employees and customers, reduced contact between employees, adoption of flexible leave policies and promoting the use of other personal protective countermeasures [7]. In the event of acute respiratory illness, self-isolation is advisable.

The selection of measures will depend on the company and the type of work and some may have significant economic consequences. Personal protective and environmental measures should be applied in combination at workplaces.

Workplace closures may be justified in exceptional circumstances, for example during pandemics of higher severity. Employees should be encouraged to self-isolate at home if experiencing respiratory symptoms.

Measures related to mass gatherings

Data originating from seasonal and pandemic influenza models indicate that during the mitigation phase, cancellations of mass gatherings before the peak of epidemics or pandemics may reduce virus transmission.

Mass gatherings increase the number of close contacts between people for long periods, sometimes in contained spaces. Therefore mass gatherings may lead to the introduction of the virus into the community hosting the event and/or facilitate virus transmission and spread.

Measures to reduce the risk posed by mass gatherings include interpersonal distancing measures to avoid crowding and organisational measures, such as cancellation, postponement or re-arrangement of an event. These measures include other non-pharmaceutical countermeasures, such as hand and respiratory hygiene.

During the containment phase, the cancellation of mass gatherings in the EU/EEA may be justified in exceptional cases (e.g. large conferences with a significant number of participants from a highly-affected area). The decision to cancel will need to be coordinated by the organiser and the public health and other national authorities on a case-by-case basis. [ECDC's contact management technical report](#) [23] can be used to assess the potential risk associated with visitors to the event and to plan further public health actions.

Due to the significant secondary effects of cancelling gatherings, the decision should be based on a risk assessment, taking into consideration the severity of the epidemic, the local epidemiological situation, the timing, duration, type of venue (indoor/outdoor), the size of the event and the area the attendees are coming from (affected or non-affected). Instead of cancellation, postponement or re-scheduling may be considered.

The extent of transmission during mass gatherings may justify the application of other measures (e.g. web-casting, education campaigns on good hygiene, enhanced environmental measures) and a risk assessment, depending on the type of event. Individuals in high-risk groups with a possibility of severe complications may choose to refrain from attending mass gatherings during an epidemic. Individuals that experience respiratory symptoms should self-isolate and seek medical advice.

Travel-related measures

International and domestic travel advice

Travel advice (or travel recommendations) refers to official government advice, which has legal and economic implications, that travellers should consider in order to minimise their risk of infection. Travel and trade restrictions are regulated under the International Health Regulations (IHR) part III. ECDC has published a [template leaflet](#) for travel advice relating to 2019-nCoV.

Travelling facilitates the spread of the 2019-nCoV from infected to uninfected areas. Although there is lack of evidence on the effectiveness of travel advice, close contact with people increases the risk of disease transmission and spread during travel [19]. Advising against travel during an epidemic aims to reduce the number of people who are infected during a trip to areas or countries where community transmission is ongoing; reduce the risk of importation from affected countries and reduce transmissions among travellers (e.g. in airport queues or on planes.)

In the context of travel recommendations, travellers should also be reminded to follow all the other appropriate preventive measures (environmental and personal protective measures) described in this document. EU/EEA countries should review their procedures for informing travellers to and from affected areas, providing updates on the situation concerning 2019-nCoV at their points of entry, advising on personal protective measures and, for persons who develop 2019-nCoV-compatible symptoms after their return, providing information on how to seek medical advice and assistance. Member States may consider directing these cases to a particular call centre or healthcare facility, depending on their planning.

Screening at entry points

This measure refers to entry screening at national borders, airports, or other places where travellers from affected areas may enter another country. Screening is usually undertaken using devices such as non-contact infrared thermometers to assess whether individuals have symptoms of infection. However, measures may also include proactive sharing of information on the infection, advice on how to seek medical assistance should symptoms develop and on how to reduce the risk of infecting others. Overall these measures aim to reduce the number of infectious people entering a country, focusing on those coming from countries that are experiencing an epidemic [25,26].

Although some imported 2019-nCoV cases have been detected through entry screening procedures at destination airports, the available evidence from peer-reviewed publications and unpublished modelling work undertaken at ECDC suggests that border control measures are not effective in delaying or mitigating a pandemic. This is due to the low sensitivity of the systems used to detect mildly symptomatic infections and their inability to detect cases during the incubation period [19,27].

EU Healthy Gateways has published a document entitled '[Interim advice for preparedness and response to cases of the 2019-nCoV acute respiratory disease at points of entry in the European Union \(EU\)/EEA Member States](#)' on the management of 2019-nCoV at points of entry [14].

Domestic travel restrictions

There is evidence that close contact of people increases transmission and spread of the virus during travel [1]. This measure refers to travel restrictions (e.g. airport and train station closures) implemented within a country or region to prevent or limit the geographical extent of virus transmission.

Broad domestic travel restrictions may have a small positive impact in delaying an epidemic only if they are implemented during its early stages [19]. Such restrictions may be effective in specific, isolated settings, but are unlikely to have a substantial impact on transmission in modern, mainly urban, societies within the EU. They are expected to have significant economical, legal and ethical implications. Therefore, such restrictions may be considered only during the containment phase of epidemics of high severity.

Border closures

This measure refers to the closure of international borders due to an epidemic which is regulated under the IHR. Border closures aim to reduce the risk of importation from countries with high transmission by implementing travel restrictions to or from an affected area.

Based on evidence from modelling studies, mainly relating to influenza pandemics, borders closures may delay the introduction of the virus into a country only if they are almost complete and when they are rapidly implemented during the early phases, which is feasible only in specific contexts (e.g. for small, isolated, island nations.) [19]. Available evidence therefore does not support recommending border closures which will cause significant secondary effects and societal and economic disruption in the EU.

The ECDC [contact management technical report](#) can be used to assess the potential risk and plan public health actions relating to travellers who have recently been in [areas with presumed community transmission of 2019-nCoV](#), or elsewhere where they may have been exposed to a case of 2019-nCoV [23]. People with a travel history to [areas with presumed community transmission of 2019-nCoV](#) are classified as 'casual contacts', unless they meet any of the criteria for becoming a 'close contact' as a result of high-risk exposure either in the area with sustained community transmission or on board an aircraft. The management of these people would then differ depending on their classification.

Due to public health risks, border closures are regulated internationally under the IHR. Within the EU, freedom of movement may be limited for public health reasons within the limits of the EU Treaties and in accordance with Directive 2004/38/EC (art. 29).

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References

1. European Centre for Disease Prevention and Control (ECDC). Risk assessment: Outbreak of acute respiratory syndrome associated with a novel coronavirus, Wuhan, China; third update 2020. Available from: www.ecdc.europa.eu/en/publications-data/risk-assessment-outbreak-acute-respiratory-syndrome-associated-novel-1
2. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. *N Engl J Med*. 2020 Jan 30.
3. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H, et al. First Case of 2019 Novel Coronavirus in the United States. *N Engl J Med*. 2020 Jan 31.
4. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *The New England Journal of Medicine*. 2020 29 January 2020.
5. Wu P, Hao X, Lau EHY, Wong JY, Leung KSM, Wu JT, et al. Real-time tentative assessment of the epidemiological characteristics of novel coronavirus infections in Wuhan, China, as at 22 January 2020. *Eurosurveillance*. 2020;25(3):2000044.
6. Saunders-Hastings PR, Krewski D. Reviewing the History of Pandemic Influenza: Understanding Patterns of Emergence and Transmission. *Pathogens*. 2016 Dec 6;5(4).
7. Lee VJ, Lye DC, Wilder-Smith A. Combination strategies for pandemic influenza response - a systematic review of mathematical modeling studies. *BMC Med*. 2009 Dec 10;7:76.
8. World Health Organization (WHO). WHO Guidelines on Hand Hygiene in Health Care: a Summary 2009. Available from: www.who.int/gpsc/5may/tools/who_guidelines-handhygiene_summary.pdf
9. Centers for Disease Control and Prevention (CDC). Community Mitigation Guidelines to Prevent Pandemic Influenza – United States, 2017 2017. Available from: www.cdc.gov/media/dpk/cdc-24-7/preventing-pandemic-influenza/community-mitigation-guidelines-for-preventing-pandemic-flu.html.
10. MacIntyre CR, Chughtai AA. Facemasks for the prevention of infection in healthcare and community settings. *BMJ*. 2015 Apr 9;350:h694.
11. Smith JD, MacDougall CC, Johnstone J, Copes RA, Schwartz B, Garber GE. Effectiveness of N95 respirators versus surgical masks in protecting health care workers from acute respiratory infection: a systematic review and meta-analysis. *CMAJ*. 2016 May 17;188(8):567-74.
12. Coia JE, Ritchie L, Adisesh A, Makison Booth C, Bradley C, Bunyan D, et al. Guidance on the use of respiratory and facial protection equipment. *J Hosp Infect*. 2013 Nov;85(3):170-82.
13. European Centre for Disease Prevention and Control (ECDC). Infection prevention and control for the care of patients with 2019-nCoV in healthcare settings 2020. Available from: www.ecdc.europa.eu/en/publications-data/infection-prevention-and-control-care-patients-2019-ncov-healthcare-settings
14. EU Healthy Gateways Joint Action Preparedness and Action at Points of Entry (Ports A, Ground crossings). Interim advice for preparedness and response to cases of the 2019-nCoV acute respiratory disease at points of entry in the European Union (EU)/EEA Member States (MS) 2020 [cited 7 February 2020]. Available from: www.healthygateways.eu/Novel-coronavirus
15. European Centre for Disease Prevention and Control (ECDC). Personal protective equipment (PPE) needs in healthcare settings for the care of patients with suspected or confirmed novel coronavirus (2019-nCoV) 2020. Available from: www.ecdc.europa.eu/en/publications-data/personal-protective-equipment-ppe-needs-healthcare-settings-care-patients
16. van Doremalen N, Bushmaker T, Munster VJ. Stability of Middle East respiratory syndrome coronavirus (MERS-CoV) under different environmental conditions. *Euro Surveill*. 2013 Sep 19;18(38).
17. Otter JA, Donskey C, Yezli S, Douthwaite S, Goldenberg SD, Weber DJ. Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: the possible role of dry surface contamination. *J Hosp Infect*. 2016 Mar;92(3):235-50.
18. Lai MY, Cheng PK, Lim WW. Survival of severe acute respiratory syndrome coronavirus. *Clin Infect Dis*. 2005 Oct 1;41(7):e67-71.
19. World Health Organization (WHO). Non-pharmaceutical public health measures for mitigating the risk and impact of epidemic and pandemic influenza. Licence: CC BY-NC-SA 3.0 IGO. 2019. Available from: <https://apps.who.int/iris/bitstream/handle/10665/329438/9789241516839-eng.pdf?ua=1>.
20. McKinney KR, Gong YY, Lewis TG. Environmental transmission of SARS at Amoy Gardens. *J Environ Health*. 2006 May;68(9):26-30; quiz 51-2.
21. European Centre for Disease Prevention and Control (ECDC). Interim guidance for environmental cleaning in non-healthcare facilities exposed to 2019-nCoV 2020 [cited 8 February 2020]. Available from: www.ecdc.europa.eu/en/publications-data/interim-guidance-environmental-cleaning-non-healthcare-facilities-exposed-2019.
22. Backer JA, Klitkenberg D, Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20–28 January 2020. *Eurosurveillance*. 2020;25(5).
23. European Centre for Disease Prevention and Control (ECDC). Public health management of persons having had contact with novel coronavirus cases in the European Union 2020. Available from: www.ecdc.europa.eu/sites/default/files/documents/Public-health-management-contact-novel-coronavirus-cases-EU_0.pdf
24. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*. 2020 January 24.

25. Selvey LA, Antao C, Hall R. Entry screening for infectious diseases in humans. *Emerg Infect Dis*. 2015 Feb;21(2):197-201.
26. European Centre for Disease Prevention and Control(ECDC). Infection prevention and control measures for Ebola virus disease: Entry and exit screening measures 2014. Available from: <https://www.ecdc.europa.eu/en/search?s=Infection+prevention+and+control+measures+for+Ebola+virus+disease%3A+Entry+and+exit+screening+measures+2014>
27. Quilty B, Clifford S, group Cnw, Flasche S, Eggo RM. Effectiveness of airport screening at detecting travellers infected with novel coronavirus (2019-nCoV). *Eurosurveillance*. 2020;25(5).