

# Outbreak of novel coronavirus disease 2019 (COVID-19): increased transmission globally – fifth update

2 March 2020

## Summary

On 31 December 2019, a cluster of pneumonia cases of unknown aetiology was reported in Wuhan, Hubei Province, China. On 9 January 2020, China CDC reported a novel coronavirus as the causative agent of this outbreak, which is phylogenetically in the SARS-CoV clade. The disease associated to it is now referred to as novel coronavirus disease 2019 (COVID-19).

As of 2 March 2020 at 08:00, more than 89 068 cases of COVID-19 have been reported worldwide, mainly in China and from all Chinese provinces; of these cases, around 9 000 cases were reported from other countries. As of 2 March, 66 countries have reported cases.

In the EU/EEA, the UK, San Marino, Monaco and Switzerland, 2 199 cases have been reported as of 2 March. Among these cases, 38 have died. Italy represents 75% of the cases (n= 1 689) and 92% of the fatalities (n = 35).

Updates on the epidemiology of COVID-19 can be found on [ECDC's website](#).

COVID-19 is caused by a contagious newly identified virus. There are no therapeutics and vaccines available and there is presumably no pre-existing immunity in the population. Symptoms of COVID-19 range from no symptoms (asymptomatic) to severe pneumonia and can lead to death. The evidence from analyses of cases to date is that COVID-19 infection causes mild disease (i.e. non-pneumonia or mild pneumonia) in about 80% of cases and most cases recover, 14 % have more severe disease and 6% experience critical illness. The great majority of the most severe illnesses and deaths have occurred among the elderly and those with other chronic underlying conditions.

The risk associated with COVID-19 infection for people in the EU/EEA and UK is currently considered to be moderate to high, based on the probability of transmission and the impact of the disease. Based on the observed epidemiologic characteristics, everyone in the population is assumed to be susceptible, although there may be risk factors increasing susceptibility. The virus spreads rapidly, and can have an enormous public health impact with substantial fatal outcomes in high-risk groups and economic and societal disruption.

Evidence from studies on influenza, and from recent experience in China, suggest that non-pharmaceutical interventions reduce transmission. Therefore, it is of paramount importance that measures that are appropriate and proportionate to each phase of the epidemic are immediately put in place to interrupt human-to-human transmission chains, prevent further spread, reduce the intensity of the epidemic and slow down the increase in cases. Such measures should be coordinated at the EU level. This will ultimately reduce COVID-19 illness, save lives and minimise the socio-economic impact. Delaying transmission or decreasing the peak of the outbreak is crucial to allow healthcare systems to prepare and cope with an increased influx of patients.

In addition, such a strategic approach based on rigorous application of these measures will allow more time for the testing of therapeutics and vaccine development. The different phases of the epidemic, e.g. from situations with no reported cases, sporadic cases or multiple introductions, local clusters of cases, to widespread sustained transmission, are referred to as scenarios in this document. Current epidemiology suggests scenario 1 (see main text for description) for EU/EEA level, which may be rapidly evolving to scenario 2. The options to be considered by national authorities for response appropriate to each scenario of the epidemic are described in detail under the dedicated section and include:

- Immediate activation of national emergency response mechanisms and pandemic preparedness plans to ensure containment and mitigation of COVID-19 with non-pharmaceutical public health measures.
- Ensuring the general public is aware of the seriousness of COVID-19. A high degree of population understanding, community engagement and acceptance of the measures put in place (including more stringent social distancing) are key in preventing further spread.
- Implementation of protocols for COVID-19 laboratory testing, diagnosis, surveillance and treatment.
- Enhancement of surveillance, epidemiological investigation, close contact tracing, management of close contacts, immediate case detection and isolation.
- Implementation of social distancing (e.g. the suspension of large-scale gatherings and the closure of schools and workplaces) to interrupt the chains of transmission.
- Adapted risk communication and provision of adequate personal protective equipment for healthcare workers and rigorous application of infection prevention and control measures in healthcare facilities.
- Provision of adequate healthcare capacity to isolate, support and actively treat patients.

## What is new in this update?

- Updated number of cases in China, in EU/EEA and globally
- Findings on disease and transmissibility from recent studies
- Risk associated with COVID-19 for people from the EU/EEA and the UK resident/travelling in areas with no cases, or multiple imported cases, or limited local transmission
- Risk to the healthcare systems in the EU/EEA and the UK
- Risk of widespread and sustained transmission in the EU/EEA and UK in the coming weeks
- Options for preparedness and response; including a proposed change in the case definition and the integration of testing for COVID-19 in surveillance systems for influenza surveillance (ARI/ILI) and severe acute respiratory infections.

Regularly updated information on severe acute respiratory syndrome coronavirus COVID-19 outbreak is available on [ECDC's website](#) [1], the European Commission [website](#) [2], and the World Health Organization's (WHO) [website](#) [3].

This risk assessment is based on published information available as of 2 March 2020, 09:00.

## 1. Event background

For event background information, please visit ECDC's [website](#) [4]. For the most recent information on the current situation regarding COVID-19, please visit this [page](#) [5].

Since ECDC's fourth update on novel coronavirus published on 14th February 2020 – and as of 2 March 2020, 08:00 – an additional 28 740 cases have been reported, including 2 123 cases in twenty-one countries in the EU/EEA and the UK. It is likely that the true number of infections, including those that are unreported and unrecognised due to mild symptoms or being asymptomatic, is much higher [6]. China changed the case definition several times during the course of the outbreak, which caused uncertainty regarding the exact number of cases and the extent of the spread of the virus

As of 1 March, local transmission has been reported in 13 countries outside of China: South Korea, Japan, Singapore, Australia, Malaysia, Vietnam, Italy, Germany, France, United Kingdom, Croatia, San Marino, Iran, the United Arab Emirates, and the United States of America [7]. There is evidence from some of these countries that local transmission has occurred in multiple locations and extensively, without direct or indirect epidemiological link to China.

The first European case was reported from France on 24 January 2020. This case had travel history to China [8]. In Germany cases were reported on 28 January, related to a person visiting from China [9]. On 30 January 2020 the World Health Organization (WHO) declared the outbreak of the novel coronavirus a public health emergency of international concern [10]. During the following weeks, multiple countries implemented entry screening measures [11] for passengers arriving from China. Thereafter, several major airlines suspended flights from China [12] and several countries repatriated citizens who lived in Wuhan [13].

A large number of cases have also been diagnosed on board the Diamond Princess, a cruise ship docked in the port of Yokohama, Japan. The first cases were reported in 4 February 2020 and the ship was then put in quarantine [14]. As of 27 February 2020, 705 passengers had tested positive for COVID-19 [15]. Among these cases, six have died.

On 22 February, the Italian authorities reported clusters of cases in Lombardy and cases from two other Regions, Piedmont and Veneto. During the following days, more cases were reported from several regions. Transmission seems to have occurred locally and not be first generation transmission from people travelling or returning from an affected area. Transmission events have been reported in hospitals, with COVID-19 cases identified among healthcare workers and patients [16,17]. During the following week, several European countries reported cases of COVID-19 [18] in travellers from the affected areas in Italy [19,20], as well as cases without epidemiological links to Italy, China or other countries with ongoing transmission [21].

During the last week of February, an increase of cases has been observed in the EU/EEA, the UK, Switzerland, San Marino and Monaco, with 2 199 cases reported from these countries as of 2 March. Among these cases, 38 have died. Italy represents 77% of the cases (n= 1 689) and 92% of the fatalities (n = 35).

During the same period, several new countries worldwide started to report cases. As of 2 March, 66 countries have reported cases. The overall number of cases reported as of 2 March is 89 068 including 3 046 deaths. The most affected countries are China (80 134), Republic of Korea (4 212), Iran (978) and Italy (1 689).

For detailed information regarding the cases detected in the EU/EEA, please visit the following [page](#) [22] on ECDC's website.

## 2. Disease background

For information on COVID-19, please visit this [page](#) [23] on ECDC's website.

### Novel coronavirus disease 2019 (COVID-19)

In December 2019, a novel coronavirus (COVID-19) was detected in three patients with pneumonia connected to the cluster of acute respiratory illness cases from Wuhan, China. By the end of February 2020, several countries were experiencing sustained local transmission, including in Europe. The most commonly reported clinical symptom in hospitalised patients is fever, followed by cough, dyspnoea and myalgia, fatigue. Less common symptoms are diarrhoea and vomiting. The infected people develop symptoms within 4–5 days on average; but the incubation period ranges from 1 to 14 days. About 80% of patients have mild to moderate disease (including non-pneumonia and pneumonia cases), 13.8% have severe disease and 6.1% are critical (respiratory failure, septic shock, and/or multiple organ dysfunction/failure). Individuals at highest risk for severe disease and death are people aged over 60 years of age and those with underlying conditions such as hypertension, diabetes, cardiovascular disease, chronic respiratory disease and cancer. Disease in children appears to be relatively rare and mild. About 2.4% of the total reported cases were individuals under 19 years of age. A very small proportion of those aged under 19 years have developed severe (2.5%) or critical disease (0.2%).

Robust estimates for final case fatality risk for COVID-19 are still lacking and biased due to incomplete outcomes and initial detections of mostly severe cases in most settings. The proportion of asymptomatic cases and milder cases who do not seek care is also not yet available. Very little evidence of milder, undetected cases was seen by the joint WHO mission in China, however in a very specific setting, on a rapidly evolving cruise ship outbreak, 51% of the laboratory confirmed cases were asymptomatic at time of confirmation [24]. Based on a large dataset from cases in China, the overall case fatality risk (CFR) among laboratory-confirmed cases was higher in the early stages of the outbreak (17.3% for cases with symptom onset from 1-10 January) and has reduced over time to 0.7% for patients with symptom onset after 1 February [25]. Mortality increased with age, with the highest mortality among people over 80 years of age (CFR 21.9%).

Although there remain important uncertainties, the evidence to date indicates that compared to SARS and MERS, the fatality rate for hospitalised cases is substantially lower for COVID-19 (4% compared to estimates of up to 28% for SARS and 65% for MERS), and that it is also lower than was seen during the 2009 H1N1 pandemic (hospitalised CFR of 9%). However, comparison with CFR for SARS and MERS should take into account that during SARS, PCR-testing was not available as widely as today and a large portion of the MERS-cases have occurred in nosocomial settings, among patients with significant pre-existing comorbidities. Comparison with pandemic or seasonal influenza should consider the difference in the definition of cases, out of which the fatalities are calculated.

Current estimates suggest a median incubation period from five to six days for COVID-19, with a range of up to 14 days. A recent modelling study confirmed that it remains prudent to consider the incubation period of at least 14 days [26,27]. The current estimates of R0 are between two and three [6,26,28]. Estimates of these parameters are likely to be revised as more information becomes available. There remains no strong evidence of transmission preceding symptom onset.

The virus was initially isolated in bronchoalveolar lavage fluid samples [29], and viral RNA has thereafter been detected in nasopharyngeal and throat swabs as well as in serum [26,27], blood [32], rectal swabs, saliva, urine [33] and stool [29,30].

Genetic analysis revealed that COVID-19 is closely related to SARS-CoV and genetically clusters within the genus *Betacoronavirus*, forming a distinct clade in lineage B of the subgenus *Sarbecovirus* together with two bat-derived SARS-CoV-like strains [29,35]. A recent study confirmed that angiotensin-converting enzyme 2 (ACE 2) is the receptor used by COVID-19 for entry into the human cells, similar to SARS-CoV [36]. The research results showed that the host's susceptibility to COVID-19 infection is primarily determined by the affinity for binding between the viral receptor-binding domain (RBD) and host receptor ACE2 in the initial viral attachment step. With a higher affinity, the binding capability increases; therefore, the number of viruses required to infect a cell is reduced. This partly explains why COVID-19 virus appears to be more transmissible than SARS-CoV [37]. A number of specific mutations were identified, which increase the affinity of the RBD to the ACE2 receptor [38]. Geographic regional differences in viral RBD structure could contribute to differences in infectivity, transmissibility and possibly to severity of COVID-19 disease.

There is currently no specific treatment or vaccine against COVID-19 infection, however several clinical trials are recruiting in Wuhan and globally to assess the effect of antiviral medicines.

## Current disease surveillance for COVID-19 at the EU level

Surveillance for COVID-19 is based on the EU case definition for probable and confirmed cases of COVID-19, which was updated on 25 February 2020 [39]

The World Health Organization has updated the clinical and epidemiological criteria used in its case definitions for the global surveillance for human infection with COVID-19 on 27 February 2020. The definition for a suspected case now includes in the criteria: people with acute respiratory infection (ARI) coming from an area with local transmission or contact to a confirmed case, as well as all severe acute respiratory infections (SARI) cases with no other aetiology irrespective of travel-history or contact to a confirmed case as suspected cases [40]. ECDC also advocates the inclusion of patients with SARI irrespective of travel-history or residence in areas with localised or (more widespread) local transmission in the EU/EEA. Cases that fit the probable or confirmed criteria of the case definition should be reported through The European Surveillance System (TESSy). Variables collected are based on the WHO interim case reporting form [41]. Data have been collected since January 2020.

The inclusion of testing for COVID-19 in patients with influenza like illness (ILI) or ARI within the routine influenza sentinel surveillance in outpatient settings should be considered; when cases or local clusters are identified in a country where no link to known areas of local transmission or other identified clusters are reported, and should be continued as routing monitoring in the subsequent scenarios.

In addition to reporting to TESSy, COVID-19 monitoring is conducted through epidemic intelligence at ECDC. Global surveillance of cases and deaths of COVID-19 is based on WHO situation reports, several other sources and active detection and verification of cases through media, social media and the different country ministries of health and public health agency websites.

## 3. ECDC risk assessment

Many unknowns remain regarding the virulence/pathogenicity, the mode of transmission, the reservoir and the source of infection of COVID-19. So far, detailed epidemiological data available are still limited, and therefore there are significant uncertainties in this risk assessment.

This assessment is based on facts known to ECDC at the time of publication, and unless otherwise stated, the assessment of risk refers to the risk that exists at the time of writing this report. It is also based on an evaluation of the limited evidence available and on expert knowledge. It follows the ECDC rapid risk assessment methodology with relevant adaptations [42].

### Risk assessment questions

1. What is the risk, as of 2 March 2020, associated with COVID-19 infection for people in the EU/EEA and UK?
2. What is the risk associated with COVID-19 for people from the EU/EEA and the UK resident/travelling in areas with no cases or limited local transmission?
3. What is the risk associated with COVID-19 for people from the EU/EEA and the UK resident/travelling in areas with local transmission?
4. What is the risk of clusters associated with COVID-19, similar to the ones in Italy, occurring in other countries in the EU/EEA and the UK in the coming weeks?
5. What is the risk of widespread and sustained transmission in the EU in the coming weeks?
6. What is the risk for healthcare systems capacity in the EU/EEA and the UK in the coming weeks?

## **What is the risk, as of 2 March 2020, associated with COVID-19 infection for people in the EU/EEA and UK?**

**The risk associated with COVID-19 infection for people in the EU/EEA and UK is currently considered moderate to high**

This assessment is based on the following factors:

- Most cases reported in the EU/EEA and the UK outside some regions in Italy have identified epidemiological links. However, there is an increasing number of cases without a defined chain of transmission. Extraordinary public health measures have been implemented in Italy and other EU/EEA countries and the UK, and strong efforts are being made to identify, isolate and test contacts in order to contain the outbreak. Despite contact tracing measures initiated to contain further spread, there continue to be cases exported between EU/EEA countries, and an increasing number of sporadic cases across EU/EEA countries. The probability of further transmission in the EU/EEA and the UK is considered high. There is still a level of uncertainty regarding several unpredictable factors in a situation that is still evolving.
- The possibility of new introductions from other countries outside China into the EU/EEA appears to be increasing as the number of countries reporting cases continues to rise. A list of these countries can be found [here](#).
- The evidence from analyses of cases to date is that COVID-19 infection causes mild disease (i.e. non-pneumonia or mild pneumonia) in about 80% of cases and most cases recover, 14 % have more severe disease and 6% experience critical illness. The great majority of the most severe illnesses, and deaths, have occurred among the elderly and those with other chronic underlying conditions. In addition to the public health impacts with substantial fatal outcomes in high-risk groups, COVID-19 outbreaks can cause huge economic and societal disruptions.

## **What is the risk associated with COVID-19 for people from the EU/EEA and the UK resident/travelling in areas with no cases or multiple imported cases, or limited local transmission?**

**The risk of acquiring the disease for people from the EU/EEA and the UK travelling/resident in areas with no cases, or multiple imported cases, or limited local transmission, is currently considered low to moderate**

This is assuming surveillance in the area is activated, tests are carried out on suspected cases and that there is sufficient testing capacity in the area. If these surveillance and case detection conditions are not met, the risk is considered moderate to high, but with a high level of uncertainty.

## **What is the risk associated with COVID-19 for people from the EU/EEA and the UK resident/travelling in areas with more widespread local transmission?**

**The risk for people from the EU/EEA and the UK travelling/resident in areas with more widespread local transmission is currently considered to be high**

This assessment is based on the following factors:

- The overall number of reported cases in areas with more widespread local transmission is high or increasing. However, there are significant uncertainties regarding transmissibility and under-detection, particularly among mild or asymptomatic cases.
- The evidence from analyses of cases to date is that COVID-19 infection causes mild disease (i.e. non-pneumonia or mild pneumonia) in about 80% of cases and most cases recover, 14 % have more severe disease and 6% experience critical illness. The great majority of the most severe illnesses and deaths have occurred among the elderly and those with other chronic underlying conditions. The areas with local transmission are also likely to increase as importations in unaffected areas keep occurring.



## What is the risk of clusters associated with COVID-19, similar to the ones in Italy, occurring in other countries in the EU/EEA and the UK in the coming weeks?

**The risk of the occurrence of clusters associated with COVID-19 in other countries in the EU/EEA and the UK is currently considered moderate to high**

This assessment is based on the following factors:

- The current event in Italy indicates that local transmission may have resulted in several clusters. The accumulated evidence from clusters reported in the EU/EEA and the UK indicates that once imported, the virus causing COVID-19 can be transmitted rapidly. It is plausible that a proportion of transmissions occur from cases with mild symptoms that do not provoke healthcare-seeking behaviour. The increase in case numbers and the number of countries outside China reporting those cases increases the potential routes of importation of the infection into the EU/EEA and the UK. Importations from other European countries have already occurred.
- The impact of such clusters in the EU/EEA would be high, especially if hospitals were affected and a large number of healthcare workers had to be isolated. The impact on vulnerable groups in the affected hospitals or healthcare facilities would be severe, in particular for the elderly.
- The rigorous public health measures that were implemented immediately after identifying the Italian COVID-19 cases will reduce but not exclude the probability of further spread.

## What is the risk of widespread and sustained transmission in the EU/EEA and UK in the coming weeks?

**The risk of widespread and sustained transmission of COVID-19 in the EU/EEA and the UK in the coming weeks is moderate to high with more countries reporting more cases and clusters**

This assessment is based on the following factors:

- There is an increasing number of countries with local or widespread local transmission around the world and in Europe that are exporting cases to unaffected areas. These exportations have caused transmission in previously unaffected areas. The control measures have up to now been able to only slow the further spread, but not to stop it.
- Cases with mild symptoms are numerous and able to transmit the infection. Cases with mild symptoms are not always aware of their potential infectivity and have sought medical care, infecting healthcare workers.
- Previously unaffected areas are reporting cases with travel history to a country that did not appear to have widespread local transmission.
- The WHO increased their assessment of the risk of spread and the risk of impact of COVID-19 to very high at a global level.

For more information on the possible scenario the epidemic may evolve into, please refer to the options for response chapter.

## What is the risk for healthcare system capacity in the EU/EEA and the UK in the coming weeks?

**The risk for healthcare system capacity in the EU/EEA and the UK in the coming weeks is considered moderate to high.**

This assessment is based on the following factors:

- As the number of reported COVID-19 cases in the EU/EEA and the UK is increasing, the probability of widespread infection is increasing from low to moderate.
- The majority of countries reported widespread influenza activity for week 8/2020, but the proportion of specimens tested positive in sentinel surveillance is slightly decreasing; some EU/EEA countries might have already moved past the peak period of high influenza circulation. For the latest influenza update see the joint ECDC–WHO/Europe weekly influenza update [43].
- If there is a significant increase in COVID-19 cases in the coming weeks, the potential impact on the public health and overall healthcare systems would be high. Increasing numbers of imported cases and local transmission chains would require additional resources for case management, surveillance, and contact tracing. Risk communication to concerned members of the public and healthcare professionals would tie up further resources. Further increased transmission could result in a significant increase of hospital admissions at a time when healthcare systems are may already be under pressure from the current influenza season. This would be exacerbated if substantial numbers of healthcare workers became infected. Specimens for COVID-19 could therefore lead to bottlenecks not only in healthcare but also in diagnostic capacity. Containment measures intended to slow down the spread of the virus in the population are therefore extremely important as outlined below in the 'Options for response' and recent ECDC guidance documents [44].

## 4. Options for preparedness and response

The following five scenarios, adapted from ECDC's strategic analysis, are used to describe the possible progression of the COVID-19 outbreak in EU/EEA countries. Currently, countries worldwide and in the EU/EEA are in different scenarios and could move rapidly from one scenario to another due to the evolving situation, particularly if there is widespread local transmission in another country or countries, and/or when testing for COVID-19 in the country increases. Current epidemiology suggests scenario 1 for EU/EEA level, which may be rapidly evolving to scenario 2.

**Scenario 0** describes a situation with no reported cases in the country and multiple introductions and/or community transmission elsewhere in Europe. At this stage, the main objective for public health measures should be to enable rapid detection and isolation of individual cases to prevent domestic transmission chains, and to prepare for the response once cases are detected in the country. As of 2 March 2020, several EU/EEA countries had not reported cases and are therefore presumed to be in this scenario.

**Scenario 1** describes a situation with multiple introductions and limited local transmission in the country. Despite the introductions there is no apparent sustained transmission (only second generation cases observed or transmission within sporadic contained clusters with known epidemiological links). In this situation, the objective is containment of the outbreak by blocking transmission opportunities, through early detection of imported and locally-transmitted COVID-19 cases in order to try to avoid or at least delay the spread of infection and the associated burden on healthcare systems. Delaying the start of local transmission will allow the current influenza season to end, freeing up some healthcare capacity. As of 2 March 2020, several EU/EEA countries had reported limited local transmission and were considered to be in this scenario.

**Scenario 2** describes a situation with increasing number of introductions and of more widespread reports of localised human-to-human transmission in the country (more than two generations of cases outside of sporadic clusters with known epidemiological links). In this situation, the objective remains to contain where practicable and otherwise slow down the transmission of the infection. This will increase the time available for development, production and distribution of PPE and effective therapeutic options, and would play a crucial role in reducing the burden on the healthcare system and other sectors, particularly if wider transmission of COVID-19 is delayed beyond the ongoing influenza season. A reduced burden would also allow for more time to increase laboratory capacity, and increase surge capacity in healthcare services. All these measures will facilitate effective treatment of infected patients [44]. Rapid collection and analysis of epidemiological and virological data will enable targeting of measures in this scenario and later. Within EU/EEA countries, Italy is currently in this scenario. Other countries in the EU/EEA might also be in this scenario, which may have undetected transmission ongoing due to lower level of case detection.

**Scenario 3** describes a situation with localised outbreaks, which start to merge becoming indistinct. In this scenario, there is sustained human-to-human transmission in the country (more than two generations of cases outside of sporadic clusters with known epidemiological links) and an increasing pressure on healthcare systems. The objective at this stage is to mitigate the impact of the outbreak by decreasing the burden on healthcare systems and protect populations at risk of severe disease. At the same time, operational research should guide developing better and more efficient diagnostic and treatment options.

**Scenario 4** describes a situation with widespread sustained transmission where healthcare systems are overburdened due to a large demand for emergency healthcare services, a strained ICU capacity, overworked healthcare workers and reduced staff availability due to illness, lack of PPE and lack of diagnostic testing capacity. The objective at this stage is still to mitigate the impact of the outbreak, decrease the burden on healthcare services, protect populations at risk of severe disease and reduce excess mortality.

The options proposed for preparedness and response aim to limit the impact of the epidemic. The options for preparedness should be conducted as early as possible, ideally while in scenario 0. The options for response are presented for each scenario.

### Options for preparedness

Due to the presence of the virus in multiple EU/EEA countries, public health authorities are recommended to adapt and activate their pandemic preparedness plans now, if this has not already been done. All EU/EEA Member States have pandemic preparedness plans, which are applicable to the current situation.

Upon activation of national pandemic preparedness and response strategies, a dedicated multi-disciplinary national crisis team should be established with clear lines of communication to the regional level, and relevant stakeholders and sectors. In addition, the regional level should have clear lines of communication to the local level. The crisis management scheme should be based on public health risk assessments and should evaluate the readiness of the public health system to implement the response measures.

The team should receive regular reports on public health system capacities (emergency operations centre, surveillance, laboratory diagnostics) and healthcare sector capacities (primary, secondary and higher-level)

including isolation capacity, occupancy rate, stockpiles, use and distribution of medical countermeasures (essential drugs, equipment for mechanical ventilation and oxygenation) and other supplies.

It is crucial to prepare or adapt business continuity plans for both healthcare and non-healthcare settings in accordance with the latest public health risk assessment and guidance from national, regional or local health authorities to ensure continuity of essential services (e.g. healthcare, transportation, energy, and information technology sectors). The business continuity plan should define the procedures and processes a business should follow in response to the potential impact of COVID-19 on critical functions (business processes, assets and human resources). The plan should also include policies and recommendations for employees with symptoms of acute respiratory illness, separation of sick employees, routine environmental cleaning and travel health advice [45] based on the objectives of the business continuity plan. Collaboration with supply chain partners may be initiated to understand the usage, availability and access to critical resources, and sustainable financing mechanisms could be put in place.

In healthcare settings, business continuity planning should be part of hospital preparedness planning to ensure the continuation of regular and emergency health services while providing appropriate care for acute respiratory symptom cases. A functional resource capacity monitoring system is required to revise the surge capacity plans and accommodate potential needs for different emergency scenarios. In the case of sustained local transmission, primary, secondary, tertiary and highly specialised healthcare facilities might experience a significant increase in the number of patients with respiratory symptoms associated with COVID-19. Absenteeism due to illness among healthcare workers may increase and lead to staff shortages. Shortages of essential healthcare resources (beds, medicines, mechanical ventilators, etc.) could last for several weeks or months. Situations may arise in which hospitals will be required to free up resources for severely ill patients, for example by discharging noncritical patients and cancelling planned non-urgent treatments. Arrangements should be made to allow for an increase of healthcare system capacities at short notice and to an appropriate level if required. Due to the rapid increase in the number of COVID-19 cases outside of China, the relevant authorities in EU/EEA countries are encouraged to plan for sufficient PPE supplies for their health professionals [46,47]. Ongoing communication between decision-making bodies and healthcare professionals with respect to emergency response arrangements in their facility is essential. For more details, please consider the related [hospital preparedness checklist](#).

To operationalise the response system, it is important to establish both a legal framework and standardised procedures that can enable its implementation. Aligned protocols should be developed for both case and contact management, while considering infection-prevention and control measures. This includes a notification system to relevant public health authorities, adequate transportation to a designated treatment facility, isolation strategy, clinical guidelines to handle a suspected or confirmed case, conveyance of samples to a designated laboratory, and a clear and effective protocol for contact tracing. It is important that planned response strategies, including testing, can be adapted to new case definitions and adjusted to a surge of cases by de-escalating procedures that might no longer be feasible and/or beneficial.

## Options for response (specific per scenario)

In this rapidly evolving epidemiological situation, EU/EEA countries should activate relevant parts of their pandemic preparedness plans and initiate the multi-sectoral crisis structures, if not already done. Proportionate and evidence-based response measures should be planned and initiated according to the local risk assessments based on local scenarios. Pre-defined objectives for the public health measures for each scenario should guide the planning and decision-making process.

Priority response measures should focus on healthcare systems and healthcare workers in order to ensure rapid detection and diagnosis of cases and protecting healthcare staff, patients and other contacts from exposure. Measures to ensure appropriate functioning of the healthcare system with increasing numbers of cases should be planned and implemented.

Non-pharmaceutical interventions may reduce and interrupt transmission, based on evidence from influenza and other respiratory viruses [44]. Therefore, it is of paramount importance that appropriate and proportionate measures to each scenario of the epidemic are put in place immediately to interrupt human-to-human transmission chains, prevent further spread, reduce the intensity of the epidemic and to slow down the increase in cases. This will ultimately reduce COVID-19 illness, save lives and minimise the socio-economic impact. Delaying transmission or decreasing the peak of the outbreak is crucial to allow healthcare systems to prepare and cope with an increased influx of patients. In addition, such a strategic approach based on rigorous application of these measures will allow more time for the testing of therapeutics and vaccine development.

Several response activities may be implemented in all scenarios, however the choice of the most suitable actions differs during the containment and mitigation phases. Below a description of the options for response per scenario, see also the table in Annex 1.



## Risk communication

Ensuring the general public is aware of the seriousness of COVID-19 outbreak is of paramount importance. A high degree of population understanding, community engagement and acceptance of the measures put in place (including more stringent social distancing) are key in preventing further spread. It should be made clear through public risk communication and health education that although this is a new and highly contagious disease, outbreaks can be managed with appropriate measures, and the vast majority of infected people will recover. Easily accessible information should be available on the signs and symptoms (i.e. fever and dry cough) of COVID-19, contact details of local health services, the population groups at risk, self-isolation, social distancing measures, travel advice and the need to rigorously implement frequent hand washing and always covering mouth and nose with tissues or elbow when sneezing or coughing.

Risk communication strategies should target different audiences, and a monitoring system should be put in place to observe public perceptions and opinions of both the outbreak, and the response to the outbreak. Risk communication strategies should clearly provide the rationale behind non-pharmaceutical countermeasures. To facilitate the adherence to and implementation of self-isolation by the public and healthcare workers, a support system should be prepared to provide essential services and supplies (e.g. food and medication), and to monitor vulnerable individuals. In order to optimise adherence to these demanding public health measures, consideration should be given to providing compensation for those who have suffered financial loss as a result of them. Please refer to the [guidance on community engagement](#) for more details.

**Scenario 1.** Messaging should be factual and focused on informing key stakeholders about the evolution of the situation globally and in Europe. Key messages for the public should include facts about the disease, transmissibility, severity and preventive measures available. Messaging should prepare for the introduction of individual cases or clusters, and highlight the existence of pandemic preparedness and crisis management plans. There should be preparations made to communicate via the appropriate channels (including social media channels) to policymakers, healthcare workers, particular risk groups and particular hard-to-reach (such as minority language groups, disabled, migrant) groups. Coordination mechanisms between policymakers, public health authorities, multi-sectoral crisis coordinators and healthcare providers should be reviewed and established to ensure consistent and coherent messaging.

**Scenario 2.** Risks should be communicated in a transparent and consistent way to stakeholders and to the public, according to the unfolding epidemiological situation. Communication on the first cases in country or region should be used as opportunities to convey key messages about the disease and local and international risk assessments. Messages should include the actions (including isolation, contact tracing, and use of PPE) being taken with acknowledgement of uncertainty. Messaging should prepare for potential actions in Scenario 2 and justify these actions. Mechanisms for feedback from key stakeholders and public to ensure impact of communication should be developed.

**Scenario 3.** Efficient risk communication is essential, as is the monitoring of public perception so that concerns are addressed and misinformation and rumours can be challenged. Frequency of risk communication to the general public has to be daily or continuous and abundant in nature in the early part of this scenario, tailored for specific target audiences in content and in communication methods. Messaging should focus on localised situational awareness, addressing concerns, highlighting individual actions for prevention and should also include positive messaging on recoveries and local efforts in a balanced manner. Public messaging should prepare for potential actions in and potential consequences of scenario 3.

**Scenario 4.** Requiring substantial risk communication efforts to ensure that the public know how to respond in case of a suspected infection. This phase requires complex and locally tailored messaging which is dependent on the local healthcare capacity situation, which need to be considered in national and international communication efforts. The close collaboration between healthcare providers, public health organisations and the general public becomes crucial. Priority messaging should be on individual measures that can be taken to protect the vulnerable and healthcare workers. Individual, religious and societal concerns around deaths and funerals need to be considered as well.

## Healthcare system (laboratory, primary care, hospital)

### Laboratory testing of COVID-19 virus

Laboratory diagnostic capacity weakness at national and community levels of healthcare can greatly reduce the effectiveness of outbreak containment [48]. Timely and accurate laboratory testing of specimens from cases under investigation is an essential part of the management of COVID-19 and emerging infections in general. Therefore, countries should have access to reliable and immediate testing, either regionally, nationally or internationally, in laboratories willing and able to perform primary detection or confirmatory testing. In order to provide support to Member States, a pool of specialised referral laboratories was established in the EU/EEA [49].

ECDC provides information on laboratory testing of suspected cases of COVID-19 using RT-PCR for EU/EEA Member States, addressing issues such as how to identify suspected cases and when to initiate testing [35,46,47]. ECDC follows up the developments in laboratory diagnostic methods and regularly updates the relevant pages on the ECDC website.

Member States should establish national laboratory diagnostic capacity for coronaviruses and have developed procedures for adequate transportation of samples [47]. Based on a mapping of laboratory capacity, 38 laboratories in 24 EU/EEA countries had diagnostics in place for COVID-19 (as of 29 January 2020) [48]; and several countries have already rolled-out the tests to the regional and local laboratories. Member States should follow up the changes in epidemic situation and be prepared to adjust the laboratory diagnostic capacity to the changing needs.

For the National Influenza Centres, WHO has established a mechanism to support the rapid shipment of diagnostic specimens to the coronavirus 'WHO referral' laboratories through the Global Influenza Surveillance and Response System (GISRS) Shipping Fund Project (SFP) [53]. ECDC and EVD-LabNet, in collaboration with WHO are developing an external quality assessment programme for national laboratories providing COVID-19 diagnostic services.

Anticipating a rapid increase in the demand, countries should consider the roll-out of primary diagnostic testing capacity to local clinical and diagnostic laboratories. Positive specimens should be subjected to confirmation by designated laboratories, and further characterisation and possible sequencing undertaken by the appointed referral or reference laboratories. In scenarios 3 and 4, only a representative subset of patients within new clusters should be confirmed, in order to avoid overwhelming the laboratories. It is recommended, that in scenarios 3 and 4, at regular intervals (e.g. every 50th or 75th or 100th patient) based on the available laboratory capacity, a positive sample should be sent to a reference/referral laboratory for confirmation and further characterisation, in order to identify and follow-up the evolutionary changes of the virus.

Countries should develop a training programme and provide the training to the laboratory staff in laboratory diagnosis of COVID-19 if the rapid expansion of laboratory diagnostic capacity is needed.

### Early detection and testing for COVID-19

Early diagnosis should be initiated for suspected cases. Countries across EU/EEA might be in different scenarios and testing approaches need to be adapted to the situation at local and national level.

In scenario 0 and 1, case identification, contact tracing and isolation is required; testing for COVID-19 should be performed for suspected cases according to the following criteria, based on the updated [WHO case definition](#):

1) a patient with acute respiratory tract infection (sudden onset of at least one of the following: cough, fever, shortness of breath) AND with no other aetiology that fully explains the clinical presentation AND with a history of travel or residence in a country/area reporting local or community transmission\* during the 14 days prior to symptom onset;

OR

2) a patient with any acute respiratory illness AND having been in close contact with a confirmed or probable COVID-19 case in the last 14 days prior to onset of symptoms;

OR

3) A patient with severe acute respiratory infection (fever and at least one sign/symptom of respiratory disease (e.g., cough, fever, shortness breath) AND requiring hospitalisation (SARI) AND with no other aetiology that fully explains the clinical presentation.

In scenario 0 and scenario 1, this implies that triage and testing of patients presenting with symptoms of acute respiratory infection and not requiring hospitalisation (e.g. patients presenting in primary care) can be based on travel and contact history. Lists of countries with local transmission are available from WHO sources, however areas with local transmission need to be communicated at national level. In addition, all patients with severe acute respiratory infection requiring hospitalisation should be considered as suspected cases on admission, also from scenario 0 and scenario 1.

However, once local transmission has been reported in the country or area (scenario 2-4), all patients presenting with symptoms of acute respiratory infection in primary care or the accident and emergency department of a hospital (first contact with the healthcare system) will be considered as suspected cases.

Healthcare workers should apply strict IPC measures when dealing with suspected cases (see below). During triage, suspected cases should be given a surgical mask and be directed to a separate area. Consideration should be given to organising separate triaging areas or facilities.

## Infection prevention and control in healthcare settings

ECDC has published a [technical report](#) on IPC for the care of patients with COVID-19 in healthcare settings as well as a [technical report](#) on [personal protective equipment](#) needs in healthcare settings for the care of patients with suspected or confirmed COVID-19 [46,54]. ECDC has also published a leaflet entitled 'Advice to healthcare workers: management of patients with COVID-19 infection'.

In order to prevent secondary transmission in healthcare settings, healthcare providers should be informed of the ongoing outbreak, and EU/EEA countries should ensure that timely and rigorous IPC measures are applied when dealing with suspect and confirmed cases, from the first suspicion of COVID-2019. ECDC recommends that suspected cases in primary and emergency care are isolated, or if this is not feasible, separated from other patients. Suspected patients should be asked to wear a surgical mask in order to reduce the spread of respiratory droplets [54]. Starting from scenario 2, organising separate areas or facilities for triaging of suspected cases should be considered and planned for in scenario 1.

Although there is so far no evidence of airborne transmission, we recommend a cautious approach due to lack of studies excluding this mode of transmission. Confirmed cases requiring admission should be placed in an isolation room with a dedicated bathroom. The placement in airborne precaution single rooms with negative pressure and ante-room, if available, is encouraged until more information about transmission routes is available. Healthcare workers managing suspected or confirmed cases should wear personal protective equipment (PPE) for contact, droplet and airborne transmission. When using PPE, the correct donning and doffing process should be followed; further information on the donning and doffing procedures can be found in the ECDC Technical Document '[Guidance for wearing and removing personal protective equipment in healthcare settings for the care of patients with suspected or confirmed COVID-19](#)' [55].

In scenario 2-4, ECDC recognises that with increasing numbers of COVID-19 cases, full compliance with airborne precautions may be challenging, because of lack of time and/or the lack of PPE. Given the lack of evidence for airborne transmission of COVID-19 to date, surgical mask may be used in case of shortage of FFP2 or FFP3 respirators. In case of aerosol-generating procedures (e.g. intubation, BAL, sputum induction), FFP2 and FFP3 respirators should always be used. Standard precautions should always be implemented for all patients, including full compliance with hand hygiene according to [WHO's 5 Moments for Hand Hygiene approach before touching a patient](#) [56], before any clean or aseptic procedure is performed, after exposure to body fluid, after touching a patient, and after touching a patient's surroundings. Respiratory hygiene measures include ensuring that all patients cover their nose and mouth with a tissue or elbow when coughing or sneezing; offering a medical mask to patients with suspected 2019-nCoV infection while they are in waiting/public areas or in cohorting rooms; performing hand hygiene after contact with respiratory secretions.

Regular cleaning followed by disinfection of patients' rooms, furniture and frequently touched surfaces with hospital disinfectants active against viruses is recommended. Staff engaged in environmental cleaning and waste management should wear appropriate PPE.

In scenario 3 and 4, mild cases may be cared for in the home environment. In this case, infection prevention and control measures as outlined in the WHO guidance for home care of patients with COVID-19, including, should be followed [57].

## Management of COVID-19 cases

Clinical presentation among reported cases of COVID-19 varies in severity from asymptomatic infection or mild illness to severe or fatal illness. Some reports suggest there is the potential for clinical deterioration during the second week of illness [26,28,54].

Patients with a mild clinical presentation may not initially require hospitalisation. However, as clinical signs and symptoms may worsen with progression to lower respiratory tract disease in the second week of illness; all patients should be monitored closely. Possible risk factors for progressing to severe illness may include, but are not limited to, older age, pregnancy and underlying chronic medical conditions such as lung disease, cancer, heart failure, cerebrovascular disease, renal disease, liver disease, diabetes, and immunocompromising conditions.

In scenario 1 and 2, hospitalisation of all confirmed cases should be considered for isolation purposes and to ensure optimal quality of care. In scenario 3, and especially in scenario 4, home health care may be considered for those presenting with mild symptoms, unless there is concern for rapid deterioration. Other reasons for home health care include symptomatic patients no longer requiring hospitalisation, where inpatient care is unavailable or unsafe (i.e. limited capacity and resources unable to meet demand for healthcare services) or in a case of informed refusal of hospitalisation [57].

Patients with severe illness should be cared for in the hospital and should be placed in an airborne infection isolation room if available, or in a single room with private bathroom. Guidance for clinical care of severe cases is available from WHO [59] and from the US CDC [58]. Physicians treating COVID-19 cases are also invited to join WHO's clinical network where new therapeutic options and experiences are exchanged.

## Community measures

ECDC [guidelines](#) for the use of non-pharmaceutical countermeasures to delay and mitigate the impact of the epidemic of COVID-19 include a description of the measures that can be applied in the community: infection prevention and control, social distancing, travel-related and screenings of travellers [44].

### Infection prevention and control in the community

The use of personal protective measures (i.e. rigorous hand hygiene, cough etiquette, and face masks) can contribute to reducing the risk of transmitting or acquiring COVID-19 infections.

Rigorous hand-washing schemes, including washing of hands with soap and water for at least 20 seconds, or cleaning hands with alcohol-based solutions, gels or tissues is recommended in all community settings in all the possible scenarios. Organisations should ensure availability of sufficiently and suitably located washbasins and taps to encourage washing. Proper hand hygiene will also reduce the transmission of other communicable diseases.

Covering the mouth and nose when coughing and sneezing (e.g. by using a paper tissue) may mechanically block the droplet transmission that is believed to be the principal transmission mode for COVID-19. The proper disposal of used tissues is important, followed by immediate hand washing after coughing/sneezing.

The use of surgical face masks may decrease risk of infecting others when worn by a person with respiratory symptoms before seeking medical advice and while being assessed. There is no evidence on the usefulness of face masks worn by persons who are not ill, therefore this is not advisable [44]. It is possible that the use of facemasks may even increase the risk of infection due to a false sense of security and increased contact between hands, mouth and eyes.

In scenario 3 and 4, all people with acute respiratory infections (with or without travel history) should be advised to seek immediate medical attention, ideally by phone first.

### Social distancing measures

Different social distancing measures can be considered in the different scenarios proposed. Self-isolation of close contacts is relevant in scenarios 1 and 2, whereas during the scenarios 3 and 4 self-isolation of symptomatic persons may be considered to reduce local transmission. In the absence of clear evidence on the infectious period, it is reasonable to assume that infectiousness coincides with the symptomatic period.

Additional steps to consider include school and day care measures or closures, measures at the workplace, and measures related to mass gatherings. In some countries such as China, internal travel restrictions or "Cordon sanitaire" have been imposed on large populations together with other containment measures.

Individual social distancing measures (e.g. avoiding shaking hands and kissing, such as avoiding crowded transports and un-necessary mass gatherings) should be followed during all the scenarios as a preventive measure.

#### *School and day care measures or closure*

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 local transmission and delaying the peak of the influenza activity [60]. COVID-19 does not appear to cause important illness or severity in children; however, it is not known if children play an important role in transmission of the virus. Therefore, proactive school closures to reduce the transmission of COVID-19 should be carefully considered on a case-by-case assessment, weigh the expected impact of the epidemic against the adverse effects of such closures on the community. If influenza is circulating in the community, proactive school closures may be considered to reduce the burden of influenza cases on healthcare systems, and thereby create capacity for managing cases of COVID-19 in scenarios 2 and 3. Before or instead of closures, health authorities should also plan to reduce transmission opportunities within schools, while children continue to attend with other measures, which may include smaller school groups, increasing physical distance of children in the class, promotion of washing of hands and outdoor classes. In the event of illness, strict isolation of sick children and staff at home or healthcare facilities is advisable in all the scenarios.

Reactive closures of schools may be necessary as a consequence of widespread virus transmission in the community and educational settings in scenario 4. Reactive school and day-care closures will probably not reduce the impact of the epidemic, but may be needed, due to high absenteeism and operational issues, especially if the spread of COVID-19 coincides with the ongoing influenza season.

### **Measures at the workplace**

Workplace measures refer to a variety of actions to reduce the risk of transmission by decreasing contact opportunities in the workplace and the community. These measures could include for example: 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 [61].

COVID-19 can be transmitted 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 in scenarios 2 and 3.

### **Measures related to mass gatherings**

Mass gatherings, such as sport events, concerts, religious events and conferences 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 or postponement of an event. During scenarios 1 and 2, 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 an 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. 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; the cancellation of mass gatherings during the scenarios 3 and 4 is therefore recommended.

Due to the significant secondary effects (social, economic, etc.) of social distancing measures, the decision on their application should be based on a case-by-case risk assessment, depending on the impact of the epidemic and the local epidemiological situation [44].

## **Travel-related measures**

Travel facilitates the spread of COVID-19 from affected to unaffected areas. Travel and trade restrictions during a public health event of international concern (PHEIC) are regulated under the International Health Regulations (IHR), part III.

### **Travel advice**

In scenarios 1 and 2, travellers visiting areas with local transmission are advised to avoid contact with sick persons, in particular those with respiratory symptoms and fever. They should also practice good hand hygiene. Travellers who develop acute respiratory symptoms within 14 days of returning from areas with ongoing local transmission should be advised to seek immediate medical attention, ideally by phone first, and indicate their travel history to the healthcare specialist. Several EU/EEA countries have issued, or are considering, travel advice for travellers to areas with local transmission. Such advice will be less useful in scenarios 3-4.

EU/EEA countries should review their procedures for informing passengers from/to affected areas at all points of entry. They should provide advice to people who develop COVID-19-compatible symptoms after their return, in accordance with national planning. Member States may consider guiding these cases to a particular call centre or healthcare facility, depending on their planning.

### **Travel restrictions**

Although WHO considers that the comprehensive measures taken by local authorities in China, which included severe travel restrictions have had a delaying effect on the epidemic within China and internationally, in general, travel restrictions at international borders or within national borders are neither efficient nor effective against outbreaks of respiratory disease, unless they can be implemented comprehensively. During the 2009 influenza pandemic, such comprehensive measures were shown to be feasible and effective only on isolated, small island countries.

China, and some other countries has used area quarantines, or so called 'cordon sanitaire' in addition to other measures on large cities, with apparent effect on delaying the spread of this disease. There is very little evidence elsewhere to suggest that such measures would work against respiratory virus epidemics, unless implemented with such a rigour that there is absolutely no movement across the 'cordon' and there is very low prior transmission outside the 'cordon'.



### Entry screening of travellers

Screening for COVID-19 involves the use of thermal scanning and/or symptom screening. Although some imported COVID-19 cases have been detected through entry screening at destination airports, the available evidence suggests that entry screening is not effective in delaying or mitigating a pandemic [44,62] or detecting incoming travellers with infectious diseases. This is especially the case for COVID-19 because the symptoms are common to other respiratory diseases, and there is concurrent increased seasonal influenza activity in the affected areas [60]. Modelling work by ECDC has assessed the effectiveness of entry screening in detecting travellers infected with COVID-19 to be low.

### Environmental cleaning and ventilation decontamination

ECDC has published an [Interim guidance for environmental cleaning in non-healthcare facilities exposed to 2019-nCoV](#) to provide options for environmental cleaning and decontamination in non-healthcare facilities (e.g. rooms, public offices, transports, schools, etc.) where COVID-19-confirmed cases have been before being diagnosed and/or admitted to hospital [63]. Although there is no evidence of effectiveness of mechanical or natural air ventilation to reduce COVID-19 transmission, there is mechanistic plausibility, and it should be applied, and enhanced especially in settings where people gather regularly [60]. Increasing the frequency of cleaning and maintenance of ventilation and air-conditioning units can be considered.

## Contact tracing and surveillance

### Contact tracing, quarantine and monitoring

ECDC has published a technical report and algorithm on public health management of persons having had contact with probable and confirmed cases of COVID-19 infection [64]. ECDC have also produced a technical report for EU/EEA countries public health authorities with an estimation of resources required for contact tracing, quarantine and monitoring activities [65].

The purpose of managing COVID-19 case contacts is to identify symptomatic contacts as early as possible for isolation and treatment and to facilitate prompt laboratory diagnostic testing. Contact tracing may also strengthen the evidence base on the characteristics and transmission pattern of the disease. For contact tracing purposes, a contact of a COVID-19 case is defined as a person who has or may have been in contact with a COVID-19 case. The classification of contacts as high-risk or low-risk exposure is based on the associated risk of infection that in turn determines the type of monitoring.

Coordination teams and physical resources should already be set up in Scenario 0 in order to enable contact tracing to start immediately when a case is identified. Coordination teams may be needed at several levels, such as the national, regional and local level, depending on the country. International coordination may also be required if a case, or its contacts, have travelled within or outside Europe. More staff will be needed at different levels as the complexity of outbreak increases with cases and contacts in multiple locations. Other preparatory activities include training of staff, call centre set-up, finalising protocols and questionnaires for data collection, setting-up of a database to collect, collate and analyse all data obtained [66].

In Scenario 1, the required objective is containment, extensive tracing and risk assessment of contacts of probable and confirmed cases detected. Immediately after a case is confirmed, the case should be interviewed and the contacts listed and classified as high-risk exposure ('close contact') or low-risk exposure contacts. The team then communicates with all contacts to inform and advise. High-risk exposure contacts will be actively monitored by public health authorities, whereas low-risk exposure contacts should self-monitor for symptoms and avoid social contacts. Quarantine, including voluntary quarantine, may be considered for high-risk exposure contacts [44]. If symptoms of illness occur, the contacts should then self-isolate and seek medical advice [64], preferably by phone first.

As the number of cases increase in Scenario 2, it will become increasingly challenging to trace all contacts of cases. The point at which extensive contact tracing becomes unsustainable due to limited resources will vary between different countries in the EU/EEA. However, there is still value in tracing contacts even if not all contacts of each case are traced [67,68]. This will help slow the spread of infection. In such a scenario, contact tracing and follow-up can be prioritised first to the highest-risk exposure contacts of each case, which are usually the easiest to find, including contacts that are healthcare workers or work with vulnerable populations, followed by as many as possible of the low-risk exposure contacts.

In Scenarios 3 and 4 contact tracing could still contribute to delaying the spread and reducing the pressure on the healthcare system, but may not be feasible. Countries could consider focusing on contacts that are healthcare workers or work with vulnerable populations.

## Surveillance

In scenario 0, the objective of surveillance is to detect early cases. Countries need to ensure that data collection and reporting systems are established. This includes development or adaptation of data collection instruments such as forms, data systems in clinical and lab settings, procedures and training of staff. The priority at this stage is to implement case-based reporting in order to allow for collection of detailed data on cases including demographic information, clinical symptoms, pre-existing conditions, place of infection, hospitalisation, severity, links to other confirmed cases and outcome. Mechanisms to allow the reporting of outcome of cases should be established. The data collection system should be able to collect variables required for TESSy reporting which are based on the WHO case reporting form [69].

Considering the possibility of eventual widespread transmission, countries should also consider planning for a reduced case-based dataset to facilitate reporting if healthcare systems become under pressure. While countries should plan for maintaining case based reporting for as long as possible aggregated reporting forms and mechanisms should be considered.

Sentinel surveillance of acute respiratory infection (ARI) and/or influenza-like illness (ILI) in primary care as well as surveillance of severe acute respiratory infection (SARI) in hospitals and ICU's will likely be a main source of data when transmission becomes widespread. In Scenario 0, countries should therefore assess ARI/ILI and SARI surveillance systems to ensure that they are resilient and able to function in case of widespread transmission of COVID-19 and pressure on healthcare services. The influenza sentinel surveillance system should be continued for COVID-19 testing when local transmission increases to be able to monitor the proportion of positives with COVID-19 among patients presenting with ILI or ARI in the population. Preparations should be made to extend ARI/ILI and SARI surveillance throughout the year if the systems usually operate until week 20.

Participating clinicians and hospitals should be appropriately trained and have adequate resources. Countries should also consider how testing for COVID-19 should be integrated within the ARI/ILI systems to allow for future monitoring of spread and intensity.

Countries should start integrating testing for COVID-19 in SARI surveillance systems already at this stage as all patients with SARI should be tested for COVID-19. Data collected should include the number of COVID-19 tests performed and number of positive tests within SARI systems. These aggregated data should be reported through TESSy, which is currently being updated to collect these data.

Excess mortality monitoring systems should also be developed or reviewed in order to be able to detect any excess mortality linked to COVID-19.

For all surveillance systems, countries need to ensure that systems are resilient in case of rapid increase in the number of cases and the eventual possibility of widespread transmission in the country and resulting pressures on healthcare workers and systems.

In addition, templates for reports analysing surveillance data should be developed in order to be ready for when cases are reported.

### Scenario 1

In scenario 1, the objectives of the surveillance system are to undertake rapid assessment of epidemiological, clinical and virological features of earliest cases, to estimate case-severity and transmissibility and detect chains of transmission, especially in healthcare settings, in order to guide decision-making and preparedness. Detected cases should be reported through national case-based surveillance systems as rapidly as possible. The European Commission, ECDC and the WHO Regional Office for Europe ask countries to report probable and confirmed cases of COVID-19 infections using the ECDC case definition within 24 hours of identification through the Early Warning and Response System (EWRS) and IHR notification. Data on cases should be reported in TESSy within 72 hours.

Detailed case based reporting at national and international level is important at this stage in order to further inform the evidence base on the epidemiology of COVID-19 infection, to provide a clear picture of transmission patterns at national and European level as well as to assess the effectiveness of containment measures.

In addition to case reporting, detailed data on contact tracing activities should be collected at regional and national level. These data will allow for better delineation of clusters of cases and allow for assessment of transmission patterns as well as further scientific investigations.

Just as in scenario 0, all SARI cases should be tested for COVID-19 and testing data should be collected through SARI surveillance. Countries should start integrating testing for COVID-19 into existing surveillance systems for ARI/ILI. Data collected should include the number of COVID-19 tests performed and number of positive tests overall and within ARI/ILI and SARI systems. These aggregated data should be reported through TESSy, which is currently being updated to collect these data. If there is suspicion of local transmission in specific locations, enhanced ARI/ILI surveillance can be implemented in the area, together with extensive testing of ARI/ILI cases in order to detect all possible cases and try to contain transmission.

Regular reports (at least weekly), should be produced based on the collected surveillance data to inform all stakeholders on the evolving situation. Similar reports should continue to be produced in later scenarios. While the number of detected cases remains small, every opportunity should be taken to evaluate national surveillance and reporting procedures and modify accordingly in order to improve efficiency and effectiveness.

### **Scenario 2**

In scenario 2, the objectives of surveillance are to provide data to inform real-time modelling, to predict and inform optimal interventions to mitigate impact and detect transmission in the general population, in order to guide decision-making and preparedness. Case-based national surveillance and reporting should continue even in the face of increasing numbers of cases for as long as resources allow, at least until a clear description of the disease, severity spectrum and outcomes has been obtained. All confirmed cases should be reported in TESSy and the full variable set included. When the number of cases means that reporting all variables on cases in TESSy is no longer feasible, a reduced dataset should be collected and reported at national level and in TESSy. The reduced dataset is described in the TESSy reporting protocol. Countries may also consider an alternative approach, collecting and reporting a limited set of variables initially, and then update cases in national systems and TESSy with additional variables at a later stage.

Surveillance of ARI/ILI and SARI should continue and will provide an indication of local transmission, although the sensitivity to detect limited local transmission will likely be low. Data on the number of COVID-19 tests performed, and number of positive tests overall and within ARI/ILI and SARI systems should continue to be collected and reported in TESSy. Any cases detected through ARI/ILI and SARI surveillance should also be reported through case reporting as described in the previous paragraph.

### **Scenario 3**

In scenario 3, the objectives of surveillance are to monitor the intensity and spread of nCoV in the population, to measure the impact on population and the health care system and to measure the impact of any mitigation measures. Case-based surveillance and national and international reporting of these data should continue as long as feasible. At this stage it is likely that detailed reporting is not feasible and a reduced dataset should be used for case-based reporting at national level and in TESSy. If a country decides to collect aggregated data on cases at national level, then these data can be reported through TESSy.

Surveillance for ARI/ILI and SARI should continue and will become increasingly more important in order to assess intensity and spread of infection. Data on the number of COVID-19 tests performed and number of positive tests overall and within ARI/ILI and SARI systems should continue to be collected and reported in TESSy.

At this stage, mortality data should be analysed and any excess mortality detected.

### **Scenario 4**

In scenario 4, the surveillance objectives are the same as in scenario 3. It is likely that case-based reporting will not be feasible at this stage. Aggregate national case surveillance should continue as long as possible but may also be stopped at this stage. Sentinel ILI/ARI and SARI surveillance will therefore likely be key sources of surveillance data together with data on the number of tests performed and positive overall and within ILI/ARI surveillance systems. These data should continue to be reported in TESSy in order to allow for an assessment of intensity across the EU/EEA. Monitoring of excess mortality is essential at this stage in order to assess the impact of the epidemic.

## **5. Substances of human origin safety**

The available data on the current epidemic indicate that COVID-19 may pose a threat to the safety and sustainability of supply with substances of human origin (SoHO). Blood supply is particularly vulnerable as it requires daily frequent blood donations, and labile blood components have limited storage time and are in general irreplaceable. The potential for transmission of COVID-19 through SoHO remains unknown. So far, the transmission of respiratory viruses (including coronaviruses) by transfusion or transplantation has not been reported. Routine donor screening measures should prevent individuals with clinically manifest respiratory infections from donating SoHO. While it seems that the risk of COVID-19 transmission through SoHO is theoretical, uncertainties about viremia during the incubation period, during an asymptomatic course of infection, or after symptom resolution continue to be of concern in relation to the safety of SoHO [32]. On the other hand, the nature of COVID-19 transmission and the extent of the epidemic indicate that there is a risk of interrupting sustainability of SoHO supply. Until more information is available on the epidemiology and pathogenesis of this infection, SoHO safety authorities in the EU/EEA countries should consider precautionary actions to mitigate the possible risks to the safety and sustainability of SoHO supply especially with blood and blood components. The response measures should be as proportionate as possible to the evolution of the actual outbreak in real time, consistent with government and public health advice.

## General measures

- The impact of COVID-19 epidemics on the SoHO supply is likely to be very significant and specific for SoHO establishments. The epidemic may affect demand or supply of SoHO, donor population, SoHO establishment staff and key consumables. Therefore, it is important that SoHO safety authorities and establishments update or develop and activate contingency (preparedness) plans and define actions that must be executed before, during and after the outbreak in order to maintain sustainability of supply. The major objective is to make every effort to ensure a continued supply of safe, high quality, life-saving products and services at the level demanded by the healthcare community.
- SoHO donors should be informed about the nature and clinical signs of COVID-19, transmission risks and related donation restrictions.
- Despite the theoretical risk of COVID-19 infectious SoHO donation, it is suggested as a precaution, to defer from donation potential donors of blood, cells and tissues for 14 days after contact with confirmed case of COVID-19. In addition, persons recovering from confirmed COVID-19 should be deferred as donors for at least 14 days after symptom resolution due to the current uncertainty regarding possible viremia and/or viral shedding in body fluids. Potential organ donors at risk of being infected should be laboratory-tested for the presence of the virus.
- SoHO establishments should also enhance post-donation information and hemovigilance/ biovigilance reporting

## Specific measures

- Unless national supply of blood, cells and tissues is not jeopardised, countries with no cases of COVID-19 or multiple introductions of the virus without sustained local transmission may consider implementing deferral or self-deferral from donation of blood cells and tissues donors for 14 days after returning from countries with sustained local transmission.
- It is suggested to temporarily stop the donation of blood, cells and tissues in localised areas with sustained local transmission where extensive containment measures have been implemented because travel restrictions and self-isolation may prevent or hinder donors or blood, cells and tissues establishment employees' ability to travel to work and collection sites, and may affect access to the supply chain for critical supplies and equipment. In order to support containment measures, countries may consider to temporarily stop donations in containment areas and provide vital blood, cells and tissues components to hospitals in these areas from non-affected parts of the country.
- In the event of widespread transmission, blood, cells and tissues establishment may need to adapt applied measures to fit the local epidemiologic situation and sustainability of blood supply. For this epidemic, derogation of mandatory donor selection criteria is considered unnecessary.
- Several coronaviruses are susceptible to inactivation with amotosalen or riboflavin and ultraviolet light when applied to platelets and plasma products [66-69]. Nevertheless, the implementation of pathogen reduction technology for mitigating the risk of transfusion-transmitted CPOVID-19 is not recommended.
- Large-size lipid-enveloped RNA viruses such as SARS-CoV-2 should be readily removed and/or inactivated during the manufacturing of plasma derivatives [74]. Thus, regular screening procedures for plasma donors and the established processes of virus inactivation and removal during manufacturing should mitigate COVID-19 transmission through plasma derivatives.
- There is no licensed test for screening of blood, cells and tissues donors/donations. Considering that transmission of COVID-19 has not been reported, that levels of detected RNA in plasma are very low [75] and coincide with clinical symptoms and that screening policy has not been implemented for other respiratory transmitted viral illnesses in which transfusion transmission remains theoretical, including influenza, it seems that laboratory screening of blood, cells and tissues donors/donations is not well grounded.

## 6. Research needs

In the current situation of the outbreak it is crucial to investigate the availability and impact of countermeasures for public health actions and clinical management. Research on most affected populations or risk groups are also required to improve case management for the prevention of severe and fatal outcomes. Prevention and control measures include the development of vaccines and antiviral treatment options, which also have an implication on the management of cases and clinical measures. Several clinical trials for different products and pharmaceutical substances are currently conducted, which require continuous funding and harmonised approaches.

Available study protocols to conduct 'First few hundred', household transmission or other studies are available from WHO and should be applied. Results should be made available as soon as possible.

Engagement and efforts should also include serological studies to analyse the impact on a population level and compare with potential pre-existing immunity in the population. Such studies require sensitive and reliable serological tests, which are currently under development requiring validation. Study protocols are currently being developed and should be conducted in a harmonised way across the EU/EEA.

The assessment of the effectiveness of PPE in various settings will help provide more evidence regarding the prevention of transmission in healthcare settings and in particular how to protect healthcare workers.

## 7. Limitations

This assessment is undertaken based on facts known to ECDC at the time of publication. There is substantial uncertainty regarding the epidemiological characteristics of the COVID-19. There is limited epidemiological and clinical information on the cases of COVID-19 identified so far (e.g. infection sources, risk factors for infection, risk factors for severe illness, extent of person-to-person transmissibility, transmission modes, effective preventive measures, and clinical presentation and evolution).

Given these limitations, ECDC will revise the current risk assessment as soon as more information becomes available.

## 8. Source and date of request

ECDC internal decision, 26 February 2020.

## 9. Consulted experts

ECDC experts (in alphabetic order): Cornelia Adlhoch, Sergio Brusin, Julien Beaute, Nick Bundle, Orlando Cenciarelli, Scott Chiossi, Edoardo Colzani, Stefania De Angelis, Dragoslav Domanovic, Margot Einöder-Moreno, Silvia Funke, Helen Johnson, John Kinsman, Csaba Ködmön, Felix Lotsch, Thomas Mollet, Lina Nerlander, Pasi Penttinen, Senia Rosales-Klitz, Andreea Salajan, Gianfranco Spiteri, Carl Suetens, Svetla Tsoleva.

## 10. Disclaimer

ECDC issues this risk assessment document based on an internal decision and in accordance with Article 10 of Decision No 1082/13/EC and Article 7(1) of Regulation (EC) No 851/2004 establishing a European centre for disease prevention and control (ECDC). In the framework of ECDC's mandate, the specific purpose of an ECDC risk assessment is to present different options on a certain matter. The responsibility on the choice of which option to pursue and which actions to take, including the adoption of mandatory rules or guidelines, lies exclusively with the EU/EEA Member States. In its activities, ECDC strives to ensure its independence, high scientific quality, transparency and efficiency.

This report was written with the coordination and assistance of an Internal Response Team at the European Centre for Disease Prevention and Control. All data published in this risk assessment are correct to the best of our knowledge at the time of publication. Maps and figures published do not represent a statement on the part of ECDC or its partners on the legal or border status of the countries and territories shown.



# Annex 1. Summary of options for response by scenario

The table illustrates options for response that could be considered in each scenario in order to limit the impact of the epidemic.

Scenarios	Characterisation	Objective and rationale of the risk management options	Options for response	Reference documents (links below table)
<b>Scenario 0</b>	No reported cases in country, multiple introductions and/or local transmission elsewhere in Europe.	<b>Containment</b>  Enable rapid detection and isolation of individual cases to prevent domestic transmission chains and to prepare for the response once cases are detected in the country	<ul style="list-style-type: none"> <li>Public health authorities are recommended to adapt and activate their pandemic preparedness plan if not already activated .</li> <li>Risk communication in accordance with epidemiological developments to public and to healthcare workers</li> </ul> <p><b>Command, control and coordination:</b></p> <ul style="list-style-type: none"> <li>Multi-sectoral coordination for preparedness and response is ongoing (e.g. with civil protection, law enforcement)</li> <li>Crisis management system is functional and includes public health services</li> <li>Public health system capacity is assessed and there is a readiness to implement response measures</li> <li>Infrastructure for rapid information exchange and decision making is in place</li> <li>Lines of command and control are clear and based on existing structures and mechanisms</li> <li>Communication lines are established between crisis management structures at national regional and local levels and other relevant stakeholders and sectors</li> <li>Communication channels between countries and international stakeholders are clear and activated, including standard operating procedures for early warning systems.</li> </ul> <p><b>Risk communication</b></p> <ul style="list-style-type: none"> <li>A risk communication strategy is available for different target audiences including: <ul style="list-style-type: none"> <li>general public</li> <li>healthcare and emergency response providers</li> <li>vulnerable groups (e.g. the elderly and people with pre-existing medical conditions).</li> </ul> </li> <li>Vulnerable and at risk populations are identified and communication material is made available in all major languages</li> <li>Different communication tools and technologies are utilised to enable risk communication messages to reach a variety of audiences</li> <li>A trusted and qualified spokesperson is in place, who will become the 'public face' of the official public health response</li> <li>Work with trusted journalists, news outlets, bloggers and influencers to facilitate the dissemination of risk communication messages</li> <li>Strategy to monitor public perceptions and opinions of the outbreak and its response measures is in place.</li> </ul> <p><b>Business continuity</b></p> <p><i>Business continuity planning applicable to different settings:</i></p> <ul style="list-style-type: none"> <li>Business continuity plans for healthcare and non-healthcare settings are developed or updated</li> <li>Risks and potential consequences on business operations and staff safety are identified</li> <li>Resources and capacities are assessed and a resource monitoring system is functional</li> <li>Sustainable funding mechanisms to maintain capacity are identified</li> <li>Collaboration with supply chain partners to understand usage, availability and access to resources is ongoing.</li> </ul> <p><b>Healthcare system:</b></p> <p><i>Business continuity planning specific to healthcare settings:</i></p> <ul style="list-style-type: none"> <li>Plan for surge capacity required to deal with the emergency of different severities is in place</li> <li>Hospital capacity monitoring system is functional</li> <li>Essential public and private services needed to support healthcare activities are identified to ensure continuation of regular and emergency services, while providing appropriate care for acute respiratory system cases (primary care, hospitalised, ICU)</li> <li>Procurement procedures to acquire the necessary material and supplies are ready to be used at short notice.</li> </ul> <p><i>Triage and testing in healthcare settings</i></p>	<b>1 - 13</b>

Scenarios	Characterisation	Objective and rationale of the risk management options	Options for response	Reference documents (links below table)
			<ul style="list-style-type: none"> <li>• COVID-19 treatment facilities are appointed</li> <li>• If the treatment facility has no laboratory capacity, a plan for the sampling and safe shipment of specimens is developed</li> <li>• Organise triage in primary care and hospitals</li> <li>• Designated referral laboratory is appointed</li> <li>• Roll-out diagnostic testing capacity to local laboratories</li> <li>• Testing: acute respiratory tract infection (ARI) and with a history of travel or residence in a country/area reporting local - transmission during the 14 days prior to symptom onset; ARI with contact with a confirmed or probable COVID-19 case in the last 14 days prior to onset of symptoms; severe ARI requiring hospitalisation</li> <li>• Laboratory resource monitoring system is available</li> <li>• Laboratory preparedness surge capacity plan is developed.</li> </ul> <p><i>Protective measures in healthcare settings</i></p> <ul style="list-style-type: none"> <li>• Remind people of the need to strictly adhere to standard infection prevention and control precautions in healthcare, including droplet, airborne and contact precautions</li> <li>• Environmental and equipment cleaning and waste management procedures are in place</li> <li>• IPC training material has been developed and training is conducted with healthcare workers and first responders</li> <li>• IPC protocol for healthcare workers and first responders is established</li> <li>• Procurement arrangements for IPC resources are in place to ensure sustainable availability of hand hygiene products, surgical masks, and PPE</li> <li>• Calculate needs of hand hygiene products, surgical masks, PPE, ventilators, pharmacy etc. for large number of cases, initiate procurement</li> <li>• Environmental and equipment cleaning and waste management procedures are in place</li> <li>• IPC training material has been developed and training is conducted with healthcare workers and first responders</li> <li>• IPC protocol for healthcare workers and first responders is established</li> <li>• Procurement arrangements for IPC resources are in place to ensure sustainable availability of hand hygiene products, surgical masks, and PPE.</li> </ul> <p><b>Community measures:</b></p> <ul style="list-style-type: none"> <li>• Policy or legal framework for non-pharmaceutical countermeasures at community and treatment facility level is in place</li> <li>• Standards for self-isolation and quarantine are developed to promote rigorous hand hygiene and cough etiquette</li> <li>• Promote social distancing measures (avoiding shaking hands and kissing, such as avoiding crowded transports and un-necessary mass gatherings)</li> <li>• Provide travel advice for travellers visiting areas with local transmission</li> <li>• Key partners and personnel for the implementation of NPC measures are identified, equipped and trained (e.g. volunteers in civil society organisations)</li> <li>• Resources for an information hotline are available</li> <li>• Equitable compensation framework for cases and caregivers is in place for those who suffer financial loss as a result of the measures put in place to counter COVID-19</li> </ul> <p><b>Contact tracing and case management:</b></p> <ul style="list-style-type: none"> <li>• Set-up coordination teams and physical resources, and conduct preparatory activities</li> <li>• Planning for provision of essential services and supplies to persons in isolation</li> <li>• Planning for outreach and regular follow-up with persons under quarantine or self-isolation (in particular with vulnerable groups)</li> <li>• Procedures for patient management are in place (e.g. triage, discharge criteria)</li> <li>• Protocol for clinical management of suspected symptomatic and confirmed COVID-19 cases is established</li> <li>• Isolation strategy in treatment facility for COVID-19 is developed</li> <li>• Protocol to notify public health authorities about COVID-19 cases is established</li> <li>• Protocol for activating ambulance for transport of suspected or confirmed cases is established</li> <li>• Protocol for contact tracing and management is established</li> <li>• Resource needs for contact tracing are outlined and available</li> <li>• Resources for tele-triage system for COVID-19 are available.</li> </ul>	

Scenarios	Characterisation	Objective and rationale of the risk management options	Options for response	Reference documents (links below table)
			<p><b>Surveillance:</b></p> <ul style="list-style-type: none"> <li>• Ensure data collection systems set up to start case-based reporting. This includes development or adaptation of data collection instruments such as forms, data systems in clinical and lab settings, procedures and training of staff</li> <li>• Ensure that variables collected at the national level are in line with the TESSy metadata set</li> <li>• Review ARI/ILI and SARI surveillance systems and consider how testing for COVID-19 could be done within these. Preparations should be made to extend ARI/ILI and SARI surveillance throughout the whole year if the systems usually operate until week 20</li> <li>• Excess mortality monitoring systems should also be developed or reviewed in order to be able to detect any excess mortality linked to COVID-19</li> <li>• Test all SARI cases for COVID-19. Collect data on number of tests done. Report through TESSy.</li> <li>• Start collecting data on number of COVID-19 tests performed and number of positive tests</li> <li>• Consider how surveillance will function in a situation of a rapid increase in the number of cases</li> <li>• When a COVID-19 case is confirmed, move to scenario 1 or 2, as appropriate</li> </ul>	
<b>Scenario 1</b>	Multiple introductions and limited local transmission in the country. No apparent sustained transmission (only second generation cases observed or transmission within sporadic contained clusters with known epidemiological links).	<p><b>Containment (block transmission and prevent further spread)</b></p> <p>Block transmission opportunities, through the early detection of imported and locally transmitted cases in order to try to avoid or at least delay the spread of infection and associated burden on healthcare systems.</p>	<ul style="list-style-type: none"> <li>• Public health authorities are recommended to adapt and activate their pandemic preparedness plan if not already activated (see annex 2)</li> <li>• Risk communication in accordance with epidemiological developments to public and to healthcare workers.</li> </ul> <p><b>Healthcare system:</b></p> <ul style="list-style-type: none"> <li>• Roll-out diagnostic testing capacity to local laboratories</li> <li>• Testing: as in scenario 0</li> <li>• Isolation of confirmed cases in an airborne infection isolation room (AIIR) with negative pressure and ante-room if available, or a single occupancy room with private bathroom if not (no positive pressure rooms)</li> <li>• Reinforce IPC measures in healthcare setting, airborne transmission precautions (PPE) for suspected and confirmed cases, aim for 100% compliance with standard precautions including hand hygiene and respiratory hygiene.</li> </ul> <p><b>Community measures:</b></p> <ul style="list-style-type: none"> <li>• Promote rigorous hand hygiene and cough etiquette</li> <li>• Provide travel advice for travellers visiting areas with local transmission</li> <li>• Promote social distancing measures (avoiding shaking hands and kissing, such as avoiding crowded transports and un-necessary mass gatherings)</li> <li>• Voluntary or enforced quarantine for close (high-risk) contacts of suspected COVID-19 cases and monitoring of symptoms</li> <li>• Consider the cancellation of mass gatherings in exceptional cases.</li> </ul> <p><b>Contact tracing</b> (immediately after a case is confirmed):</p> <ul style="list-style-type: none"> <li>• Interview the case</li> <li>• List contacts and classify them as high-risk exposure ('close contact') or low-risk exposure contacts</li> <li>• Communicate with all contacts to inform and advise</li> <li>• Public health authorities to actively monitor high-risk exposure contacts (quarantine, including voluntary quarantine may be considered)</li> <li>• Low-risk exposure contacts to self-monitor for symptoms and avoid social contacts</li> <li>• If symptoms of illness occur, the contacts to self-isolate and seek medical advice, preferably by phone first.</li> </ul> <p><b>Surveillance:</b></p> <ul style="list-style-type: none"> <li>• Start case-based national surveillance and reporting</li> <li>• Report diagnosed cases through case-based surveillance in TESSy with as many variables as possible completed</li> <li>• Evaluate case-based national surveillance and reporting procedures and modify</li> <li>• Collect detailed data on contact tracing activities</li> <li>• Test all SARI cases for COVID-19. Collect data on number of tests done. Report through TESSy</li> <li>• In order to detect local transmission, test samples taken through ARI/ILI surveillance systems for COVID-19. Collect data on number of tests done. Report through TESSy</li> </ul>	<b>1 - 13</b>

Scenarios	Characterisation	Objective and rationale of the risk management options	Options for response	Reference documents (links below table)
<b>Scenario 2</b>	Increasing number of introductions and of local reports of human-to-human transmission in the country (more than two generations of cases outside of sporadic contained clusters with known epidemiological links).	<p><b>Containment or slow down transmission</b></p> <p>Contain and slow down the transmission of the infection to reduce the burden on the healthcare system and other sectors.</p>	<ul style="list-style-type: none"> <li>Public health authorities are recommended to adapt and activate their pandemic preparedness plan if not already activated (see annex 2)</li> <li>Risk communication in accordance with epidemiological developments to public and to healthcare workers.</li> </ul> <p><b>Healthcare system:</b></p> <ul style="list-style-type: none"> <li>Protocols on how to conduct contact tracing updated</li> <li>Testing as in scenario 0</li> <li>Consider organising separate triaging areas or facilities</li> <li>Isolation of confirmed cases in an airborne infection isolation room (AIIR) with negative pressure and ante-room if available, or a single occupancy room with private bathroom if not (no positive pressure rooms)</li> <li>Reinforce ICP measures in healthcare setting, airborne transmission precautions (PPE) for suspected and confirmed cases, aim for 100% compliance with standard precautions including hand hygiene and respiratory hygiene</li> <li>Consider organising home care for mild cases without risk factors for severe disease, train healthcare workers to inspect home environment and instruct family members/healthcare workers about home IPC measures and aggravation of symptoms.</li> </ul> <p><b>Community measures:</b></p> <ul style="list-style-type: none"> <li>Promote rigorous hand hygiene and cough etiquette</li> <li>Provide travel advice for travellers visiting areas with local transmission</li> <li>Promote social distancing measures (avoiding shaking hands and kissing, such as avoiding crowded transports and un-necessary mass gatherings)</li> <li>Isolation for suspected or confirmed cases</li> <li>Consider the cancellation of mass gatherings in exceptional cases</li> <li>Consider measures at the workplace (support teleworking, increased use of email and teleconferences to reduce close contacts, reduce contacts between employees and customers)</li> <li>Consider proactive school and day care measures or closure if influenza is circulating in the community to reduce the burden of influenza cases on the HC system.</li> </ul> <p><b>Contact tracing:</b> as in scenario 1:</p> <ul style="list-style-type: none"> <li>Contact tracing, isolation and monitoring as resources permit, still useful even if not all contacts are traced</li> <li>If resources are limited, prioritise contact tracing and follow-up to the highest-risk exposure contacts of each case, including contacts that are healthcare workers or work with vulnerable populations, followed by as many as possible of the low-risk exposure contacts.</li> </ul> <p><b>Surveillance:</b></p> <ul style="list-style-type: none"> <li>Continue case-based national surveillance and reporting</li> <li>Report diagnosed cases through case-based surveillance in TESSy with as many variables as possible completed. If not feasible to collect all variables, complete only reduced data set variables</li> <li>Collect detailed data on contact tracing activities as long as feasible</li> <li>Test all SARI cases for COVID-19. Collect data on number of tests done. Report through TESSy</li> <li>In order to monitor local transmission nationally, test samples taken through ARI/ILI surveillance systems for COVID-19. Collect data on number of tests done. Report through TESSy</li> <li>Excess mortality monitoring systems should be developed or reviewed in order to detect any excess mortality linked to COVID-19</li> </ul>	<b>1 - 14</b>
<b>Scenario 3</b>	Localised outbreaks, which start to merge and become indistinct; sustained human-to-human transmission in the country (more than two generations of	<p><b>Mitigation</b></p> <p>Mitigate the impact of the outbreak by decreasing the burden on healthcare systems and protect</p>	<ul style="list-style-type: none"> <li>Implementation of pandemic preparedness plan;- risk communication in accordance with epidemiological developments to public and to healthcare workers;</li> <li>Implementation of pandemic preparedness plan.</li> </ul> <p><b>Healthcare system:-</b> Testing as in scenario 0</p> <ul style="list-style-type: none"> <li>Organisation of separate triaging areas or facilities</li> <li>Isolation of confirmed cases in an airborne infection isolation room (AIIR) with negative pressure and ante-room if available, or a single occupancy room with private bathroom if not (no positive pressure rooms)</li> </ul>	<b>1 - 14</b>

Scenarios	Characterisation	Objective and rationale of the risk management options	Options for response	Reference documents (links below table)
	cases outside of sporadic contained clusters with known epidemiological links) and increasing pressure on healthcare systems.	populations at risk of severe disease. Produce information on preventive measures and clinical management options.	<ul style="list-style-type: none"> <li>• Reinforce ICP measures in healthcare setting, airborne transmission precautions (PPE) for suspected and confirmed cases, aim for 100% compliance with standard precautions including hand hygiene and respiratory hygiene</li> <li>• Organise home care for mild cases without risk factors for severe disease, send trained healthcare workers to inspect home environment and instruct family members/healthcare workers about home IPC measures and aggravation of symptoms triggering hospitalisation.</li> </ul> <p><b>Community measures</b></p> <ul style="list-style-type: none"> <li>• Promote rigorous hand hygiene and cough etiquette</li> <li>• Promote social distancing measures (avoid shaking hands and kissing, avoid crowded places, avoid crowded transports, avoid attending mass gatherings)</li> <li>• Self-isolation for suspected or confirmed cases not requiring hospitalisation (see home care for mild cases)</li> <li>• Consider the cancellation of mass gatherings</li> <li>• Consider measures at the workplace (support teleworking, increased use of email and teleconferences to reduce close contacts, reduce contacts between employees and customers)</li> <li>• Consider proactive school and day care measures or closure if influenza is circulating in the community to reduce the burden of influenza cases on the HC system.</li> </ul> <p><b>Contact tracing</b> as in scenario 2 if still feasible. Could consider focusing on contacts that are healthcare workers or work with vulnerable populations.</p> <p><b>Surveillance:</b></p> <ul style="list-style-type: none"> <li>• Continue case-based national surveillance and reporting as long as feasible.</li> <li>• Report diagnosed cases through case-based surveillance in TESSy, focusing only on required variables, or aggregate reporting through TESSy</li> <li>• Test all SARI cases for COVID-19 Collect data on number of tests done. Report through TESSy</li> <li>• Test samples taken through ARI/ILI surveillance systems for COVID-19. Collect data on number of tests done. Report through TESSy</li> <li>• Reporting of weekly activity in ARI/ILI surveillance systems.</li> <li>• Analyse mortality data to detect excess mortality.</li> </ul>	



Scenarios	Characterisation	Objective and rationale of the risk management options	Options for response	Reference documents (links below table)
<b>Scenario 4</b>	Widespread sustained transmission and healthcare systems over-burdened due to large demand for emergency healthcare services, strained ICU capacity, overworked healthcare workers and reduced staff availability due to illness, lack of PPE and lack of diagnostic testing capacity.	<b>Mitigation</b>  Mitigate the impact of the outbreak, decrease the burden on healthcare services, protect populations at risk of severe disease and reduce excess mortality.	<ul style="list-style-type: none"> <li>Risk communication in accordance with epidemiological developments to public and to healthcare workers;</li> <li>Implementation of pandemic preparedness plan</li> </ul> <p><b>Healthcare system:</b> - Testing as in scenario 0</p> <ul style="list-style-type: none"> <li>Organisation of separate triaging areas or facilities</li> <li>Isolation of confirmed cases in an airborne infection isolation room (AIIR) with negative pressure and ante-room if available, or a single occupancy room with private bathroom if not (no positive pressure rooms)</li> <li>Reinforce ICP measures in healthcare settings, airborne transmission precautions (PPE) for suspected and confirmed cases, aim for 100% compliance with standard precautions incl. hand hygiene and respiratory hygiene</li> <li>Organise home care for mild cases without risk factors for severe disease, send trained healthcare workers to inspect home environment and instruct family members/healthcare workers about home IPC measures and aggravation of symptoms triggering hospitalisation</li> <li>Set up additional temporary healthcare units/facilities for hospitalisation and treatment of COVID-19 cases.</li> </ul> <p><b>Community measures</b></p> <ul style="list-style-type: none"> <li>Promote rigorous hand hygiene and cough etiquette</li> <li>Promote social distancing measures (avoid shaking hands and kissing, avoid crowded places, avoid crowded transports, avoid attending mass gatherings)</li> <li>Self-isolation for suspected or confirmed cases not requiring hospitalisation (see home care for mild cases)</li> <li>Consider the cancellation of mass gatherings</li> <li>Consider measures at the workplace (support teleworking, increased use of email and teleconferences to reduce close contacts, reduce contacts between employees and customers)</li> <li>Consider reactive school and day care closure may be necessary as a consequence of widespread virus transmission in the community and educational settings.</li> </ul> <p><b>Contact tracing</b> as in scenario 2 if still feasible. Could consider focusing on contacts that are healthcare workers or work with vulnerable populations</p> <p><b>Surveillance</b></p> <ul style="list-style-type: none"> <li>Focus on aggregate national surveillance if case-based surveillance not feasible</li> <li>Case based or aggregate reporting through TESSy</li> <li>Test all SARI cases for COVID-19. Collect data on number of tests done. Report through TESSy</li> <li>Test samples taken through ARI/ILI surveillance systems for COVID-19. Collect data on number of tests done. Report through TESSy.</li> <li>Reporting of weekly activity in ARI/ILI surveillance systems</li> <li>Analyse mortality data to detect excess mortality.</li> </ul>	<b>1 - 14</b>

#### ECDC and WHO guidance documents referred to in Annex I

- [ECDC. Case definition and European surveillance for human infection with novel coronavirus \(2019-nCoV\)](#)
- [ECDC. Infection prevention and control for the care of patients with 2019-nCoV in healthcare settings](#)
- [ECDC. Personal protective equipment \(PPE\) needs in healthcare settings for the care of patients suspected or confirmed with 2019-nCoV](#)
- [ECDC. Coronavirus Factsheet for health professionals](#)
- [ECDC. Public health management of persons, including health care workers, having had contact with COVID-19 cases in the European Union](#)
- [ECDC. COVID-19. Resource estimation for contact tracing, quarantine and monitoring activities in the EU/EEA](#)
- [ECDC. Algorithm for management of contacts of probable or confirmed 2019-nCoV cases](#)
- [ECDC. Guidelines for the use of non-pharmaceutical measures to delay and mitigate the impact of 2019-nCoV](#)
- [ECDC. Interim guidance for environmental cleaning in non-healthcare facilities exposed to 2019-nCoV](#)
- [ECDC. Guidance on community engagement for public health events caused by communicable disease threats in the EU/EEA](#)
- [ECDC. Checklist for hospitals preparing for the reception and care of coronavirus 2019 \(COVID-19\) patients](#)
- [WHO. Home care for patients with suspected novel coronavirus \(nCoV\) infection presenting with mild symptoms and management of contacts.](#)
- [WHO. Clinical management of severe acute respiratory infection when novel coronavirus \(nCoV\) infection is suspected 2020](#)
- [WHO. Rational use of personal protective equipment for coronavirus disease \(COVID-19\): interim guidance](#)

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