



Presidenza del Consiglio dei Ministri

DIPARTIMENTO DELLA PROTEZIONE CIVILE

COMITATO TECNICO SCIENTIFICO

EX OO.C.D.P.C. 03/02/2020, N. 630; 18/04/2020, N. 663; 15/05/2020, N. 673; 07/10/2020, N. 706

Verbale n. 115 della riunione tenuta, presso il Dipartimento della Protezione Civile, il giorno 11 ottobre 2020

	PRESENTE	ASSENTE
Agostino MIOZZO	X	
Fabio CICILIANO	X	
Massimo ANTONELLI	X	
Giovannella BAGGIO	IN VIDEOCONFERENZA	
Roberto BERNABEI	X	
Silvio BRUSAFFERRO	IN VIDEOCONFERENZA	
Elisabetta DEJANA		X
Mauro DIONISIO		X
Ranieri GUERRA	IN VIDEOCONFERENZA	
Achille IACHINO	X	
Sergio IAVICOLI	X	
Giuseppe IPPOLITO	X	
Franco LOCATELLI	IN VIDEOCONFERENZA	
Nicola MAGRINI	PRESENTE Ammassari in rappresentanza di AIFA	
Francesco MARAGLINO	X	
Rosa Marina MELILLO	IN VIDEOCONFERENZA	
Nausicaa ORLANDI	IN VIDEOCONFERENZA	
Flavia PETRINI	IN VIDEOCONFERENZA	
Kyriakoula PETROPULACOS	IN VIDEOCONFERENZA	
Giovanni REZZA	X	
Luca RICHELDI	X	
Giuseppe RUOCCO		X
Nicola SEBASTIANI	X	
Andrea URBANI	X	
Alberto VILLANI	X	
Alberto ZOLI	IN VIDEOCONFERENZA	

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È presente il Sig. Ministro della Salute Roberto Speranza.

È presente il Sig. Vice Ministro della Salute Pierpaolo Sileri (in videoconferenza).

È presente il Sottosegretario di Stato alla Salute Sandra Zampa (in videoconferenza).

È presente il Commissario straordinario per l'attuazione e il coordinamento delle misure di contenimento e contrasto dell'emergenza epidemiologica COVID-19 Domenico Arcuri.

È presente il Capo di Gabinetto del Ministero della Salute Dr Goffredo Zaccardi (in videoconferenza).

È presente il Capo Ufficio Stampa del Ministero della Salute Cesare Buquicchio.

È presente la Dr Adriana Ammassari in rappresentanza di AIFA (in videoconferenza).

La seduta inizia alle ore 15,10.

INTERVENTO DEL SIG. MINISTRO DELLA SALUTE

Il Sig. Ministro della Salute apre la riunione, ringraziando ciascun componente del CTS per il lavoro finora svolto.

Il Sig. Ministro della Salute condivide alcuni aspetti relativi alla prosecuzione dell'azione del CTS, attraverso una ridefinizione delle proprie attività al fine di garantire ottimale efficienza al modello d'intervento adottato a seguito della contingenza epidemica per non disperdere l'eccezionale patrimonio di conoscenza che ha consentito al Paese di superare la fase di crisi, grazie all'azione sinergica delle Istituzioni che hanno partecipato in maniera corale alla gestione dell'emergenza.

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Il Sig. Ministro ha sottolineato, inoltre, l'esigenza attuale di sostenere dal punto di vista scientifico il Governo nel contenimento del numero dei contagi da SARS-CoV-2. Al riguardo, dopo una lunga fase in cui si sono consentite riduzioni delle restrizioni di contenimento del contagio grazie ad indici epidemiologici favorevoli, viene condivisa la necessità di iniziare nuovamente ad intraprendere nuove misure restrittive resesi necessarie a causa del costante e continuo incremento degli indici epidemiologici nelle ultime dieci settimane, prima del possibile ulteriore peggioramento delle condizioni legate al contagio da SARS-CoV-2 nel Paese.

Il Sig. Ministro della Salute anticipa al CTS alcuni punti di analisi che saranno sottoposti al CTS medesimo in maniera puntuale attraverso la trasmissione della bozza del DPCM di prossima emanazione, riassumibili nei seguenti punti:

- Prevenzione degli assembramenti e della concentrazione di persone;
- Valutazioni concernenti il rischio di trasmissione del virus SARS-CoV-2 negli sport di contatto.

Il CTS condivide con il Sig. Ministro la preoccupazione relativa all'incremento delle attività di ricovero nei reparti di terapia intensiva nel Paese, rilevando, al contempo, una significativa discrepanza tra i dati forniti dalla cabina di monitoraggio nazionale ed i dati dell'indagine conoscitiva che la Società Italiana di Anestesia Analgesia Rianimazione e Terapia Intensiva – SIAARTI sta realizzando attraverso la raccolta diretta dei dati dai reparti di terapia intensiva ospedalieri.

Al momento, comunque, non si rileva alcuna criticità sull'offerta di assistenza ad alta intensità di cura sull'intero territorio nazionale.

Il CTS condivide con il Sig. Ministro l'evidenza, in alcuni contesti territoriali, dell'ingravescente difficoltà nelle azioni di tracciamento dei contatti da parte dei Dipartimenti di Prevenzione delle Aziende Sanitarie.

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Il CTS condivide con il Sig. Ministro la preoccupazione relativa alle recenti esternazioni mediatiche riportate dai mezzi di comunicazione e osservate in trasmissioni televisive miranti alla delegittimazione delle attività del Comitato Tecnico Scientifico.

Il CTS evidenzia altresì la potenziale criticità rappresentata dagli ospiti delle RSA e di come si renda fondamentale il coinvolgimento dei medici di medicina generale per il fondamentale ruolo dell'assistenza e della sorveglianza domiciliare che consentirebbero di ridurre in maniera sostanziale l'afflusso non congruo dei pazienti fragili nei contesti ospedalieri.

Il CTS rileva, inoltre, l'assoluta necessità dell'azione di controllo da parte delle Autorità competenti circa l'osservanza delle norme varate e delle raccomandazioni emanate dal Comitato Tecnico Scientifico per la prevenzione degli assembramenti collegati al mancato rispetto del limite di riempimento dei mezzi di trasporto, al fine del contenimento del contagio.

Per la prosecuzione delle azioni di mitigazione del contagio si rende necessaria un'analisi strutturata dei seguenti aspetti:

- Ridefinizione della quarantena;
- Ridefinizione del periodo di isolamento fiduciario;
- Ridefinizione delle modalità di *testing* per la diagnosi di positività al SARS-CoV-2.
- Implementazione delle attività di *testing* attraverso il coinvolgimento dei medici di medicina generale e dei pediatri di libera scelta;
- Ridefinizione delle modalità lineari di comunicazione formale al fine di fornire informazioni istituzionali corrette e tempestive ai cittadini.

ANALISI SULLA DURATA DELLA QUARANTENA E DELL'ISOLAMENTO FIDUCIARIO

Il CTS, durante le sedute n. 107 del 15/09/2020 e n. 108 del 18/09/2020, ha analizzato eventuali possibilità di riduzione del periodo della quarantena per i soggetti risultati

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positivi al SARV-CoV-2 e ai soggetti identificati dalle indagini epidemiologiche quali contatti stretti.

Sulla base della rilevazione dell'incremento ubiquitario delle curve di contagio in Italia ed in Europa, il CTS, in coerenza con la Letteratura internazionale (allegati) e adottando il principio di massima cautela, sottolinea l'esigenza di aggiornare il percorso diagnostico per l'identificazione dei casi positivi così come la tempestiva restituzione al contesto sociale e lavorativo dei soggetti guariti. Per le stesse motivazioni, il CTS ha ritenuto di ridefinire i criteri della quarantena dei contatti stretti dei casi confermati positivi al virus SARS-CoV-2, così come identificati a seguito delle indagini epidemiologiche per il tracciamento dei contatti dei Dipartimenti di Prevenzione, considerando efficaci i medesimi criteri quarantenali anche per i cittadini rientranti da Paesi esteri per i quali era stata finora prevista la quarantena di 14 giorni.

Al riguardo, per il raggiungimento dell'obiettivo strategico connesso alla sostenibilità diagnostica nella contingenza epidemica sostenuta dal virus SARS-CoV-2, il CTS rimarca la necessità del coinvolgimento dei medici di medicina generale e dei pediatri di libera scelta per le attività di effettuazione dei tamponi, sottolineando che, in assenza del loro contributo fattivamente operativo, potrebbe determinarsi una notevole ripercussione su altre strutture del sistema sanitario (es. dipartimenti di prevenzione delle ASL/AST) del Paese.

Il CTS, di seguito, riporta le diverse fattispecie e la relativa ridefinizione dei periodi di quarantena o di isolamento fiduciario:

DEFINIZIONI DI ISOLAMENTO E QUARANTENA (vedi anche schema)

L'isolamento è il provvedimento restrittivo di isolamento domiciliare che si attua ai soggetti confermati positivi al SARS-CoV-2 (l'art. 1 comma 6 del DL 16/05/2020, n. 33

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convertito, con modificazioni, dalla legge 14/07/2020, n. 74 identifica questa fattispecie con il termine "quarantena").

La **quarantena** è un provvedimento preventivo che si attua ad una persona sana (contatto stretto) che è stata esposta ad un caso confermato positivo al virus SARS-CoV-2 (l'art. 1 comma 7 del DL 16/05/2020, n. 33 convertito, con modificazioni, dalla legge 14/07/2020, n. 74 identifica questa fattispecie con la locuzione "quarantena precauzionale").

CASI POSITIVI ASINTOMATICI

Diagnosi: confermata da test molecolare positivo

Isolamento: 10 giorni + tampone molecolare unico a fine isolamento (da effettuare anche dai medici di medicina generale e/o dai pediatri di libera scelta)

CASI POSITIVI SINTOMATICI

Diagnosi: confermata da test molecolare positivo

Isolamento: almeno 10 giorni (dei quali obbligatoriamente gli ultimi 3 in completa assenza di sintomi, con l'eccezione dell'ageusia e anosmia che possono persistere per tempi lunghi) + tampone molecolare unico a fine isolamento (da effettuare anche dai medici di medicina generale e/o dai pediatri di libera scelta)

CASI POSITIVI PERSISTENTEMENTE ASINTOMATICI CHE NON SI NEGATIVIZZANO DOPO 21 GIORNI

Diagnosi: confermata da test molecolare positivo

Isolamento: come per i casi positivi asintomatici fino ad un massimo di 21 giorni, con riscontro di positività al test molecolare effettuato al 10° e 17° giorno (nei casi asintomatici, con l'eccezione dell'ageusia e anosmia che possono persistere per tempi lunghi, l'isolamento si

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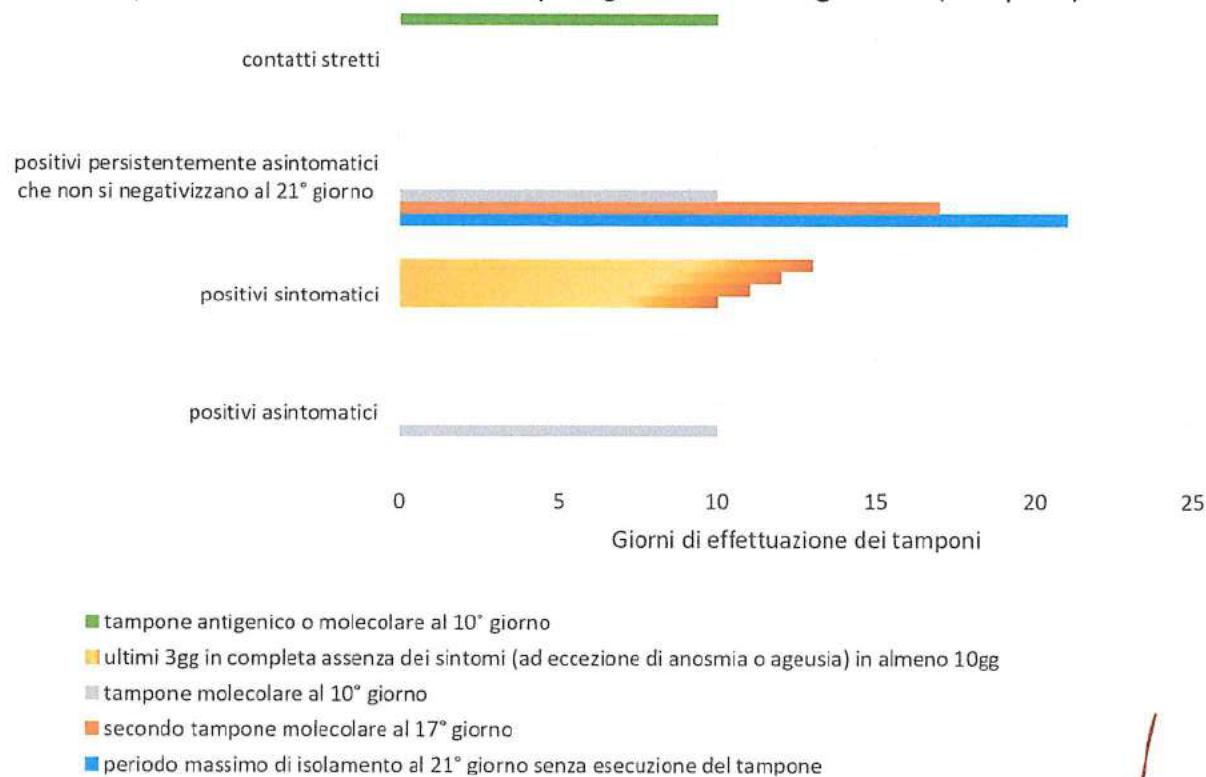
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interrompe comunque al 21° giorno in quanto le evidenze disponibili non documentano alcun caso di presenza di virus competente per la replicazione)

CONTATTI STRETTI

Quarantena: 10 giorni + tampone a fine quarantena (antigenico o molecolare da effettuare anche dai medici di medicina generale e/o dai pediatri di libera scelta) o, in alternativa, 14 giorni senza esecuzione del tampone a fine quarantena.

Sintesi delle rideterminazioni dei periodi di isolamento e quarantena con cadenza e tipologia dei test diagnostici (tamponi)



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ANALISI DEI CRITERI RELATIVI ALLA DEFINIZIONE DEI CONTATTI STRETTI DEI CASI CONFERMATI POSITIVI AL VIRUS SARS-COV-2

In relazione alla eventuale ridefinizione dei criteri e delle caratteristiche dei contatti stretti dei casi confermati positivi al virus SARS-CoV-2, viene discussa la necessità di considerare la possibilità di differenziare, tra i contatti stretti, coloro che indossano idonei dispositivi di protezione da chi non li indossa, in particolare all'interno delle scuole. L'argomento, data la complessità della tematica, costituirà uno specifico punto all'ordine del giorno in una delle prossime sedute del CTS.

Il CTS conclude la seduta alle ore 19,45.

		ASSENTE
Agostino MIOZZO		
Fabio CICILIANO		
Massimo ANTONELLI		
Giovannella BAGGIO	IN VIDEOCONFERENZA	
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Giuseppe RUOCCHI		X
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RAPID RISK ASSESSMENT

Increased transmission of COVID-19 in the EU/EEA and the UK – twelfth update

24 September 2020

Summary

Epidemiological developments

COVID-19 case notification rates have increased steadily across the EU/EEA and the UK since August 2020, but this is not having the same impact in all countries. In several countries the observed upsurge correlates with increased testing rates and intense transmission among individuals between 15 and 49 years of age. In such countries most detections concern mild or asymptomatic cases. However, in a number of other countries, the upsurge coincides with high or increasing notification rates in older individuals and, consequently, an increased proportion of hospitalised and severe cases. The observed increased transmission levels indicate that the non-pharmaceutical interventions in place have not achieved the intended effect, either because adherence to the measures is not optimal or because the measures are not sufficient to reduce or control exposure. In addition, the vulnerability of the population to infection remains high, as available data from seroprevalence studies suggest that the level of immunity in the population is <15% in most areas within the EU/EEA and the UK. The current epidemiological situation in many countries is concerning as it poses an increasing risk of infection for vulnerable individuals (individuals with risk factors for severe COVID-19 disease, such as the elderly) and healthcare workers, particularly in primary care, and calls for targeted public health action.

What is the risk being assessed in this update?

In this update, we analyse the risk posed to the general population, vulnerable individuals, and healthcare provision by the current increase in COVID-19 case notification rates observed in the EU/EEA and the UK.

In countries observing stable and low notification rates, and low test positivity, **the risk of COVID-19 for the general population and for healthcare provision is low**, based on a low probability of infection and low impact of the disease. Regarding vulnerable individuals, the overall risk is **moderate** based on a low probability of infection and very high impact of the disease.

In countries observing high or sustained increase in notification rates, or high test positivity, but with high testing rates and transmission occurring primarily in young individuals, **the risk of COVID-19 is moderate** for the general population and for healthcare provision, based on a very high probability of infection and low impact of the disease. However, **the risk of COVID-19 is very high** for vulnerable individuals, based on a very high probability of infection and very high impact of the disease.

In countries observing high or sustained increase in notification rates, or high test positivity, and an increasing proportion of older cases, and/or high or increasing COVID-19 mortality, **the risk of COVID-19 is high** for the general population, based on a very high probability of infection and moderate impact of the disease.

However, **the risk of COVID-19 is very high** for vulnerable individuals, based on a very high probability of infection and very high impact of the disease.

Options for response

Preparing for a scenario of widespread transmission - Several countries appear to be now progressing from limited local community transmission towards sustained community transmission. This requires a strong response, focused on both containment and mitigation measures. Geographic areas that did not experience widespread transmission during the first wave may have a higher level of population susceptibility and be less prepared to address the increasing demand for healthcare. Therefore, public health efforts should focus on strengthening healthcare capacity to manage potentially high numbers of COVID-19 patients.

Key target populations - The current epidemiological situation calls for focused public health actions tailored at:

- controlling transmission among older children and adults younger than 50 years of age
- protecting medically vulnerable individuals
- protecting healthcare workers, particularly those involved in providing primary care.

Non-pharmaceutical interventions (NPI) - Until a safe and effective vaccine against COVID-19 is available, NPIs will continue to serve as the main public health tool to control and manage SARS-CoV-2 outbreaks. However, several NPIs can have a negative impact on the general well-being of people, the functioning of society, and the economy. Therefore, their use should be guided by the local epidemiological situation, with the overall goal of reducing transmission and protecting the most vulnerable individuals in society.

Testing strategies – Testing strategies have evolved over the course of the epidemic and should now focus on more widespread testing in the community, prevention of nosocomial transmission, rapid identification and containment of outbreaks and identification of infectious cases to prevent further transmission. Easy access to testing and timeliness of testing is critical for the effectiveness of measures such as contact tracing and isolation of cases.

Contact tracing - Rapid identification, testing regardless of symptoms, and quarantine of high-risk contacts remains one of the most effective measures to reduce transmission. ECDC also recommends the testing of low-risk exposure contacts regardless of symptoms in high-risk settings (e.g. nursing homes), to enable early identification of secondary cases and initiate further contact tracing.

Quarantine - Fourteen day quarantine is recommended for persons who have had contact with confirmed SARS-CoV-2 cases. This can be shortened to 10 days after exposure, if a PCR test at day 10 is negative.

Maintaining strong messaging to promote compliance with key protective behaviours - Risk communication messages should emphasise that the pandemic is far from over, and that the SARS-CoV-2 virus continues to circulate within the community. The overarching messages proposed by ECDC earlier in the pandemic remain valid: 'This is a marathon, not a sprint'; and 'We must not drop our guard'. People's behaviour continues to be the key to controlling the pandemic.

Risk communication for younger people - Reduced compliance by younger people to protective measures is of increasing concern. Communication campaigns specifically targeting young people should ideally be based on insights gained through behavioural research in order to ensure that the messages resonate with and are acceptable to the target population. It is essential that young people see themselves as part of the solution, and that they are actively engaged in strategies to control the pandemic as well as in the recovery effort.

Protecting mental health - While the fall in COVID-19 cases over the summer months and the accompanying lifting of some restrictive measures may have provided respite, the ongoing return to high incidence rates and the consequent potential for a re-imposition of restrictive measures in some countries is likely to lead to renewed stresses. The mental health of people who have had COVID-19 is another issue of concern, with evidence indicating high rates of psychological ill health after physical symptoms have cleared.

Event background

The timeline of the major events can be found on the ECDC website: <https://www.ecdc.europa.eu/en/novel-coronavirus/event-background-2019>.

The latest available data on the number of cases and number of deaths globally is published daily on the ECDC website: <https://www.ecdc.europa.eu/en/covid-19/situation-updates>.

Epidemiological situation

Between 1 March and 13 September 2020, EU/EEA countries and the UK have reported 2 576 750 cases and 184 029 deaths (representing 9% of all cases and 20% of all deaths reported worldwide during this period) due to COVID-19. Since the previous ECDC RRA published on 10 August, 763 572 new cases and 5 683 new deaths have been reported in the EU/EEA and the UK (Figure 1 and Annex 1).

On 13 September 2020, the 14-day case notification rate for the EU/EEA and the UK was 76 per 100 000 population. The overall case notification rate has been increasing over the last two months. Although there is substantial variation between national incidence levels, the increasing trend is common to most countries in the EU/EEA and the UK. In week 37 (7–13 September 2020), sustained increases (>10%) in the 14-day COVID-19 case notification rates were observed in 13 countries: Czechia, Denmark, Estonia, France, Hungary, Ireland, Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain and the United Kingdom [1].

Figure 1. Panel A: EU/EEA and the UK, 14-day COVID-19 case notification rate and 14-day COVID-19 death notification rates, from 1 March to 13 September 2020. Panel B: EU/EEA and the UK, testing rate and test positivity (%), from 1 March to 13 September 2020

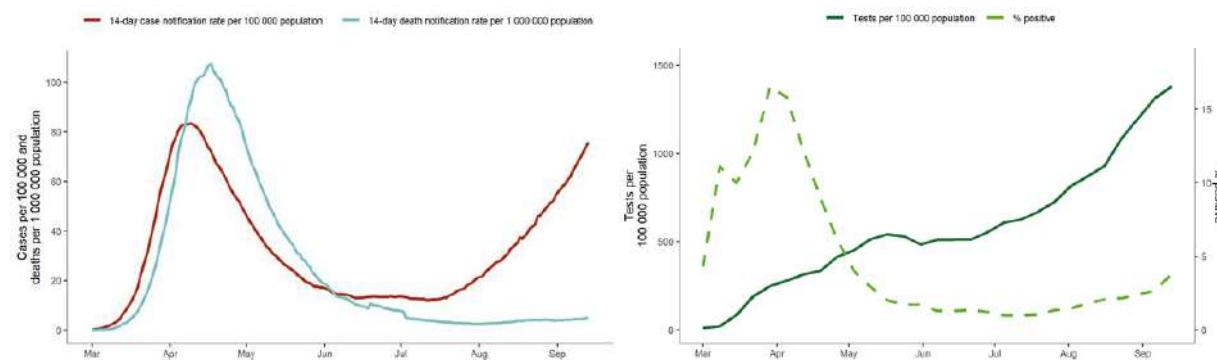
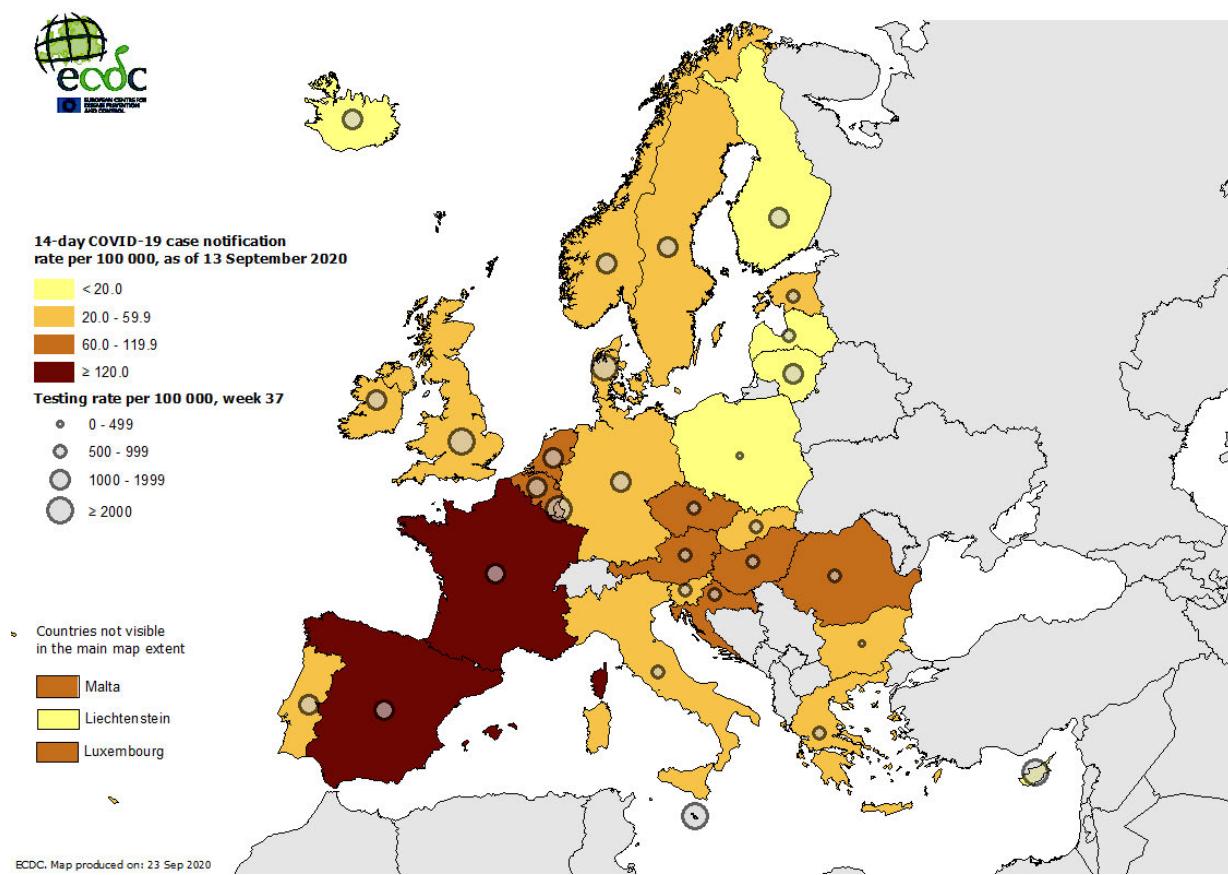


Figure 2. EU/EEA and the UK: 14-day COVID-19 case notification rate with testing rate, as of 13 September 2020



At the sub-national level, there is substantial variation within and across countries, with some regions reporting no cases in the last 14 days and others reporting an incidence higher than 120 per 100 000 population (Figure 3). Ten EU/EEA countries have at least one region with 14-day COVID-19 case notification rates over 120 per 100 000 population. For the period analysed, which compared weeks 35/36 with weeks 36/37, an increasing trend in the 14-day COVID-19 case notification rate was seen in most countries (Figure 4).

Figure 3. EU/EEA and the UK: 14-day COVID-19 case notification rate at subnational level, weeks 36-37 2020

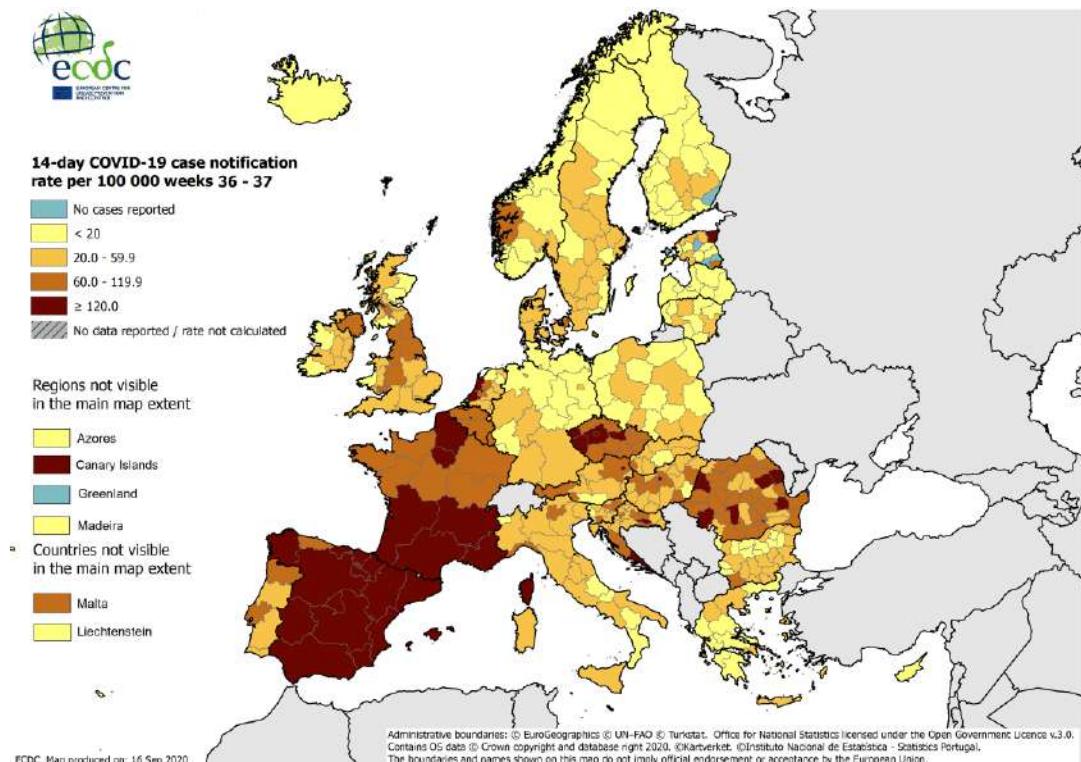
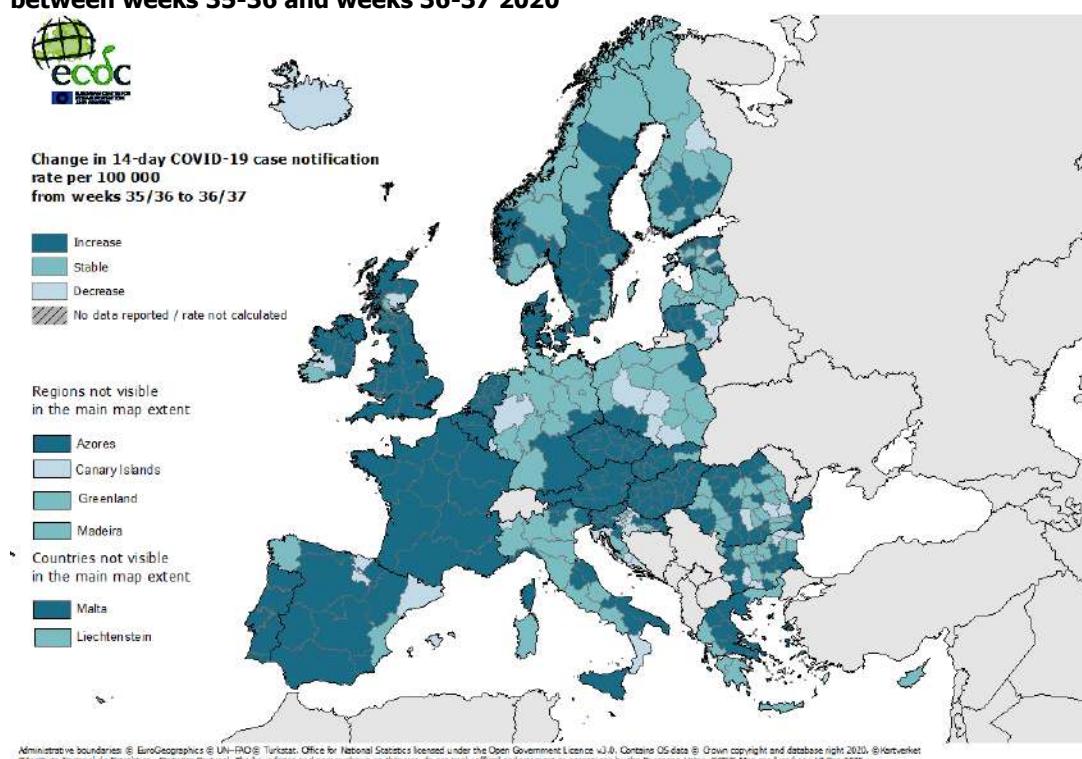


Figure 4. EU/EEA and the UK: Change* in 14-day COVID-19 case notification rate at subnational level between weeks 35-36 and weeks 36-37 2020



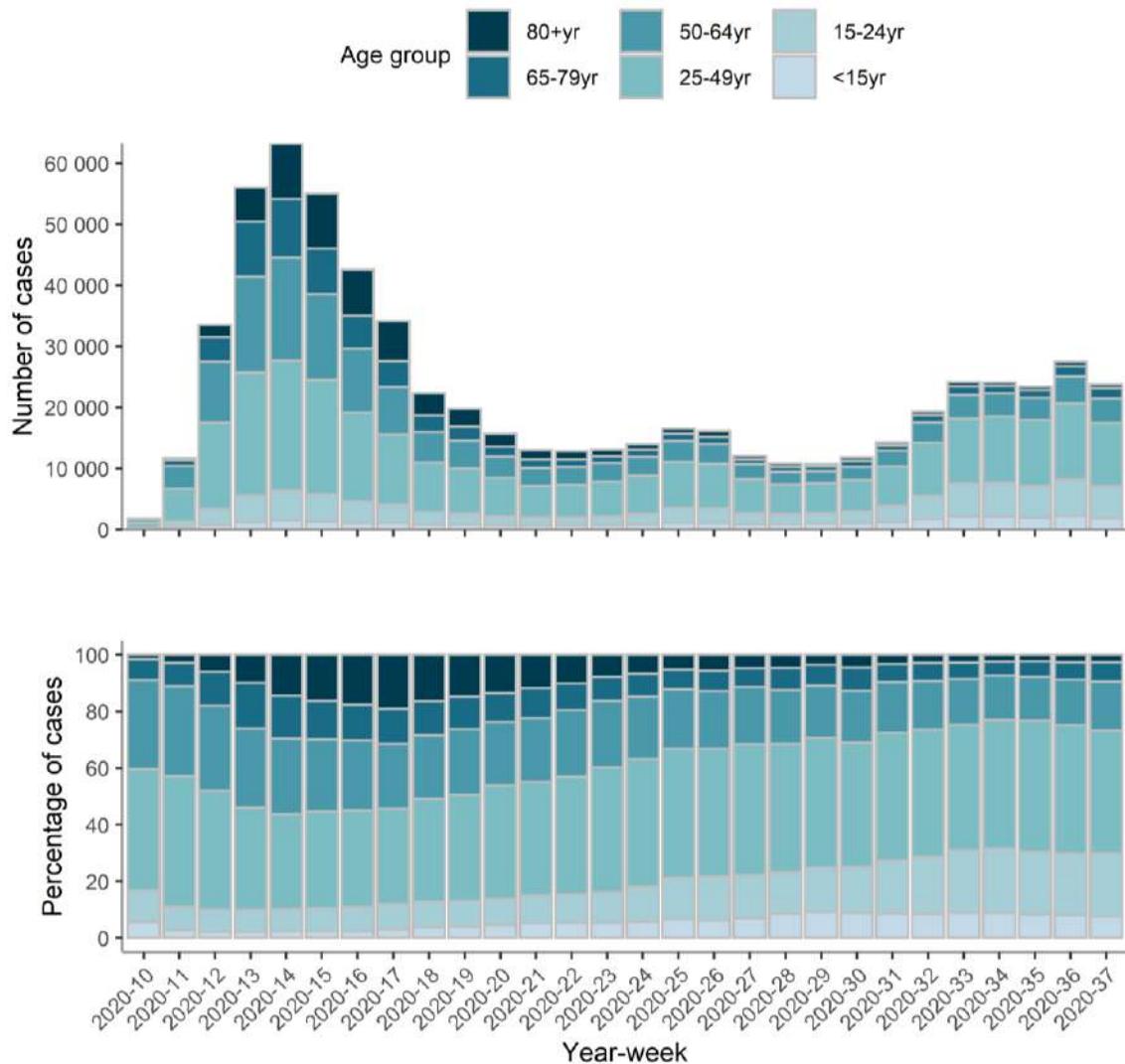
*Trend for day x compares 14-day rate on day x with that on day x-7. Regions with low 14-day notification rates (<10 cases per 100 000) or which do not meet the criteria below for an increasing/decreasing trend are classified as stable trend.
Increasing/decreasing trend defined as a relative rate change of >10% or an absolute rate change of >10 per 100 000.

The 14-day COVID-19 death notification rate for the EU/EEA and the UK was five (country range: 0–30) per million population. The overall rate was stable for 72 days (Figure 1 Panel A). However, in week 37 sustained (>10%) increases in this indicator were observed in Croatia and Spain [2]. Pooled estimates of all-cause mortality reported by EuroMOMO show normal levels in Europe. However, in Belgium and Spain a small excess mortality is observed. The excess mortality particularly affected those 65 years of age and older [3].

Testing rates have increased steadily since the beginning of the pandemic in most EU countries, even though strategies and rates of testing vary greatly (Figure 1 Panel B; Figure 2). Furthermore, the overall test positivity for SARS-CoV-2 has been increasing since the beginning of August, with an increasing pace in recent weeks (Figure 1 Panel B). In week 37, Austria, Bulgaria, Czechia, France, Hungary, Netherlands, Romania, Slovakia, Slovenia and Spain had a weekly test positivity of 3% or higher.

The number of new cases reported to The European Surveillance System (TESSy) increased by 8% in the last two weeks (31 August–13 September) compared with the previous two-week period (17–30 August) (Figure 5). The proportion of new cases among individuals between 15 and 49 years of age also increased. In the past four weeks, the median age of reported cases was 33 years (interquartile range 23–49) and 52% were men. Since mid-August, the incidence of new cases in the age groups 15–24 and 25–49 was consistently higher than all other age groups. In the last four weeks, 67% of cases were in the 15 to 49 age group, with those 25–49 years of age accounting for the largest proportion of cases (45%). Of the cases reported to TESSy in the last four weeks, 8.4% were individuals over 65 years old, 5.9% were individuals 65–79 years old, and 2.5% were individuals 80 years or older. However, in a number of countries, the case notification rates in older individuals are increasing.

Figure 5. Age distribution COVID-19 cases reported in TESSy by week in 17 EU/EEA countries*
between 1 March and 13 September 2020



* Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Iceland, Ireland, Latvia, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal and Sweden

From 17 August to 13 September, 249 fatal cases were reported to TESSy in the EU/EEA and the UK. Deaths have continued to be highest in those 80 years of age and older (49%). The median age of the fatal cases was 80 years (IQR 71-86). Please note that there are inherent delays in the number of fatal cases reported to TESSy. Since 17 August, 3581 (3.6%) reported cases were hospitalised. The median age of hospitalised cases was 60 years (IQR 41-74). In the last four weeks, among the 239 (0.2%) severe cases reported in TESSy, 44% were 15 to 49 years of age. This age group accounts for the highest proportion of severe cases (Annex 2, Figure 1 and Figure 2).

Non-pharmaceutical interventions

The ECDC Response Measure Database collects the different non-pharmaceutical interventions (NPIs) enacted to prevent the spread of the SARS-CoV-2 virus by country in the EU/EEA and the UK since January 2020. Figure 6 shows the different NPIs in place in two points in time: 1 June and 1 September 2020. The two dates were selected to observe possible changes triggered by the summer season, a period in which we have observed a resurgence of cases in most countries.

Importantly, this visualisation shows a comparison of two points in time, and it is not a period analysis. In fact, several countries have introduced measures between or after the two dates selected. This visualisation portrays only measures that were active, or introduced, on the two dates.

Figure 6. Non-pharmaceutical interventions implemented at the national level in EU/EEA countries and the UK



Closure of public places: Most non-essential economic activities, in all countries, were required to shut down or severely limit their services during spring. In June, all countries still had measures demanding shops and public venues remain closed. As of 1 September, these measures have been eased or removed in almost all countries.

Looking at entertainment venues, 24 out of the 30 EU/EEA countries and the UK did not allow these places to operate on 1 June. Sixteen countries still presented the same restrictions as of 1 September.

In 18 countries, restaurants and cafes were required to shut down in June. In September, this measure was in place in 13 countries.

Mass gatherings: During the spring and early summer, all EU/EEA countries introduced limitations on the number of people allowed to gather at public events, both indoors and outdoors. Between June and September, this category of measures had been either eased (allowing a larger number of people to gather in public spaces) or removed almost everywhere in the EU/EEA and the UK.

Teleworking and facemasks: Teleworking recommendations have largely remained unchanged between 1 June and 1 September. While we noted some slight changes in the degree to which they are implemented, the mandatory use of facemasks has also remained the same in all countries.

Local and regional measures implemented: A rise in measures implemented at a lower geographical level has been observed. This reflects regional differences in incidence within countries and detection of local outbreaks.

- **Social bubbles:** The recommendation of having interactions and physical meetings only between pre-selected peers over time, sometimes known as 'support' or 'social' bubbles, have been implemented in different areas, for instance, in August and September 2020, this recommendation was issued in the Greater Manchester area, in Belfast, and in Glasgow (UK) [4,5].
- **Localised cordon sanitaire:** This limits movement within or outside an area, unless strictly necessary, while also limiting or completely prohibiting gatherings and, in some instances, restricting bars and restaurants activities. In August and September 2020, such measures were implemented, for instance, in Catalonia and in the Comunidad de Madrid (Spain), Casamaina di Lucoli (Italy) and the Caerphilly County Borough (UK) [6-10].

Disease background

For information on the latest scientific evidence on COVID-19, please visit ECDC's website:
<https://www.ecdc.europa.eu/en/2019-ncov-background-disease>.

This update of the risk assessment only provides an overview of the latest information and current understanding of individual and population immunity against SARS-CoV-2, re-infection, clade distribution of circulating virus and prophylaxis, treatment and supportive care.

Immunity

The understanding of immunity against SARS-CoV-2 is still incomplete. Binding and neutralising antibodies to SARS-CoV-2 have been shown to develop in most individuals between day 10 and day 21 after infection [11-14]. Reviews of the published literature indicate that most patients develop IgG seropositivity and neutralising antibodies following primary infection with SARS-CoV-2 in >91% and >90% of cases, respectively. T-cell responses against the SARS-CoV-2 spike protein have been characterised and correlate well with IgG and IgA antibody titres in COVID-19 patients, which has important implications for vaccine design and long-term immune response [15-17].

Various studies indicate that most patients mount an immune response following a SARS-CoV-2 infection, but that this immunity may wane over time. Waning immunity appears to be more likely in individuals with a less severe primary infection [18-21]. SARS-CoV-2 antibody levels have been detected up to 94 days after infection [22]. More recent studies found that antibody titres peak between 3-4 weeks after infection, and remain relatively stable up to four months after infection [23]. Neutralising activity also starts to decline after one to three months from symptom onset, as recently reported in a series of longitudinal studies on convalescent patients [24-27]. The longevity of the antibody response to SARS-CoV-2 is still to be determined, but it is known that antibody levels to other coronaviruses wane over time (range: 12–52 weeks from the onset of symptoms) and homologous reinfections have been documented [28,29].

Several countries in Europe are conducting longitudinal studies that will provide an opportunity to monitor in more detail the progression of immunity over time.

SARS-CoV-2 reinfection

Whilst reinfections are known to occur for other seasonal coronaviruses, the extent of SARS-CoV-2 re-infection remains unknown [30]. As described in the ECDC Threat Assessment Brief, 'Reinfection with SARS-CoV-2: Considerations for public health response' [31], only six confirmed cases of SARS-CoV-2 reinfections have been published so far [32-34]. While it is likely that the currently documented cases represent an under-estimation of the true number of reinfections, the evidence available so far indicates that this is an uncommon event.

Seroprevalence in EU/EEA and UK

Population-based sero-epidemiological surveys aim to measure the proportion of the population that has antibodies against SARS-CoV-2. ECDC and WHO have established a European network to provide support to countries undertaking sero-epidemiological studies and are collating the results from studies conducted in European countries.

The early results from such studies indicate that in most countries, the prevalence of individuals with SARS-CoV-2 antibodies is well below 15%. Higher estimates of prevalence have been reported in small local areas heavily affected during the early phase of the pandemic, such as the ski resort of Ischgl in Austria, where the prevalence among the general population was 42.2% [35].

Estimates of sero-prevalence among groups with high risk of exposure such as healthcare workers, have been found to be higher than in the general population. For example, 31.6% of healthcare workers at a hospital in London had antibodies against SARS-CoV-2 in May and June [36].

Virus characterisation

The genetic clade distribution of strains circulating in the EU/EEA since mid-July 2020 is similar to the clade distribution observed in March to May 2020 [37,38]. From the data available in the GISAID EpiCoV database [39] with data from 16 July 2020, there is no correlation between clade distribution and resurgence of cases at the national level.

Pharmaceutical interventions

Prophylaxis

A global effort to develop vaccines for protection against COVID-19 has, as of 17 September 2020, resulted in nine vaccine candidates that have entered phase II/III or phase III clinical trials globally [40,41]. An EU vaccine strategy with the aim to accelerate the development, manufacturing and deployment of COVID-19 vaccines was initiated on 17 June 2020 [42]. In return, for the right to buy a specified number of vaccine doses in a given timeframe, the European Commission will finance part of the upfront costs faced by vaccine producers in the form of Advance Purchase Agreements financed with the EU Emergency Support Instrument [43].

A portfolio of potential vaccines produced by different companies is foreseen. It should be stressed that it is currently unknown which vaccine candidates will be successful in the ongoing clinical trials. Two Advance Purchase Agreements have been signed with Astra Zeneca and Sanofi Pasteur/GlaxoSmithKline. Astra Zeneca initiated their phase III trial for their non-replicating viral vector candidate expressing the SARS-CoV-2 S-protein in May 2020. Sanofi Pasteur/GSK is expected to start their phase III trial for their protein subunit SARS-CoV-2 S-protein candidate with the AS03 adjuvant at the end of 2020. Further negotiations are ongoing between the European Commission and the following four companies: Johnson & Johnson (non-replicating viral vector expressing the SARS-CoV-2 S-protein), Curevac (mRNA encoding for SARS-CoV-2 viral protein/s), Pfizer/BioNTech (mRNA encoding for SARS-CoV-2 viral protein/s), and Moderna (mRNA encoding for SARS-CoV-2 viral protein/s). In addition, some EU Member States are either arranging for bilateral agreements with individual companies or participate in the global mechanism for procurement named COVAX [44].

Many of the frontrunner vaccine candidates, including those of Moderna and Pfizer, are developed to be administered intramuscularly in two doses 3-4 weeks apart. Johnson & Johnson intends to trial a one-dose vaccine, and the AstraZeneca–Oxford team is looking at one- and two-dose regimens. UNICEF is currently calling for governments with industry stakeholders to arrange for transportation of the temperature-sensitive COVID-19 vaccines [45].

One of the phase III clinical trials (Astra Zeneca AZD1222) was halted in early September because of a possible vaccine safety signal. The company did not disclose the nature of the participant's illness, but The New York Times reported that the volunteer, based in Britain, was diagnosed with transverse myelitis, an inflammatory syndrome that affects the spinal cord and often is sparked by viral infections. This vaccine candidate is being tested in large-scale Phase 2 and Phase 3 trials in the United States, Britain, Brazil, South Africa and India. After review by the Data Safety Monitoring Board with external vaccine safety experts and the UK national regulatory agency MHRA, the clinical trial was resumed in the UK on the 12 September [46].

For individuals not able to respond to active immunisation due to congenital or acquired immunodeficiency, SARS-CoV-2-specific hyperimmunglobulin and monoclonal antibody products for prophylaxis are under development [47].

Recommendations for prioritisation of which target groups should be vaccinated first when vaccines are only available in short supply are expected in the coming months. On September 14, WHO SAGE published a 'Values framework for the allocation and prioritisation of COVID-19 vaccination' that offers guidance on the allocation of COVID-19 vaccines and on the prioritisation of groups for vaccination within and between countries while supply is limited [48].

Treatment and supportive care

Surveillance data reported to ECDC show that the case-fatality rate has been decreasing in several European countries compared to the peaks in March and April 2020. In several countries, the recent increases in number of cases have not been followed by a corresponding increase in the number of deaths. This can be attributed to the currently higher case identification capacity thanks to more extensive testing (i.e. allowing for the identification of cases that would not have been detected in March-April), to the higher numbers of younger individuals affected, (Figure 5), and to the inclusion of a larger number of asymptomatic cases due to changes in testing strategies.

Significant decreases in case fatality have also been observed among patients in older age groups [49]. This decrease could be attributable to improvements in the clinical management of severe cases, including the introduction of treatments such as steroids and remdesivir, as well as improvements in the management of adult respiratory distress syndrome (ARDS), such as optimising the use of high-flow nasal oxygen and non-invasive ventilation, and the recognition of the role of hypercoagulability and endothelial injury in the disease pathogenesis which allowed clinicians to prevent certain complications through administration of anticoagulants (e.g. heparin).

ECDC risk assessment

This assessment is based on information available to ECDC at the time of publication and, unless otherwise stated, the assessment of risk refers to the risk that existed at the time of writing. It follows the ECDC rapid risk assessment methodology, with relevant adaptations [50]. The overall risk is determined by a combination of the probability of an event occurring and its consequences (impact) for individuals or the population [50].

Risk assessment question

Given the increase in notification rates observed in the EU/EEA and the UK, what risk does the COVID-19 pandemic pose to the general population, vulnerable individuals, and COVID-19 healthcare provision?

Countries are currently experiencing different epidemiologic patterns which pose different risks and require targeted interventions.

Based on recent epidemiological information (Annex 3), it is possible to categorise EU/EEA countries and the UK as observing either 'stable trends' or 'concerning trends'. The latter group is defined here as those that meet any two of the following criteria:

- high ($\geq 60/100\,000$) or sustained increase (≥ 7 days) in 14-day case notification rates
- high ($\geq 60/100\,000$) or sustained increase (≥ 7 days) in 14-day case notification rates in older age groups (65-79 years old AND/OR 80 years or older)
- high ($\geq 3\%$) or sustained increase (≥ 7 days) in test positivity
- high ($\geq 10/1\,000\,000$) or sustained increase (≥ 7 days) in 14-day death rates.

The definition of trends and threshold used in the criteria above are available in the ECDC Weekly COVID-19 country overview report [51].

Countries with stable trends: As per 13 September, the EU/EEA countries with a stable trend include Belgium, Cyprus, Finland, Germany, Greece, Iceland, Italy, Latvia, Liechtenstein, Lithuania, Poland and Sweden (Annex 3). In these countries, the overall probability of infection is assessed as low. Because of the low proportion of cases in elderly individuals, and the current low proportion of severe cases and low death notification rates, the impact of the disease is assessed as low. At this time, there is an overall **low risk** of COVID-19 for the general population and the healthcare system in these countries. Regarding vulnerable individuals (individuals with risk factors for severe COVID-19 disease, such as the elderly) [52], since the impact of the disease in these groups is very high, the overall risk is **moderate**.

Close monitoring of the evolving epidemiological situation, including infections detected at the primary care level, the level of occupancy of hospital and ICU beds and the spread of infections amongst vulnerable individuals, for whom the impact of COVID-19 is very high, are key to avoid a rapid increase in the risk level in the coming weeks.

Countries with concerning trends: As per 13 September, the other group includes all the remaining EU/EEA countries and the UK. The increased notification rates may be partially explained by the steady increase in testing rates that occurred in recent weeks and months (e.g. Luxembourg, Denmark and the UK) as well as by the larger number of young, mild or even asymptomatic cases that have been tested. However, due to the high volume of transmission, it appears that the NPIs in place have not been effective in limiting significant increase of infection, either because adherence to the measures may not be optimal or the measures in place may not be sufficient to reduce or control exposure. In addition, available data from seroprevalence studies suggest that the level of immunity in the population is <15% in most areas within the EU/EEA and the UK, and, since a vaccine will not be available in the short-term, the vulnerability of the population to infection remains high. Based on this, in these countries the overall probability of infection is very high.

These countries with concerning trends can be placed into two sub-groups. One sub-group includes those countries where high and increasing notification rates are reported due to high testing rates, and transmission is reported primarily in young individuals, with a low proportion of severe cases and low death notification rates (<10/1 000 000). This sub-group includes Austria, Denmark, Estonia, France, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Slovakia, Slovenia and the United Kingdom. Since severe COVID-19 and death is more common among vulnerable individuals and these groups are currently less affected than other groups, the impact of the disease is still low. This gives an overall **moderate risk** of COVID-19 for the general population and for healthcare provision. However, it should be noted that with a high volume of transmission continuing over the course of several weeks, shielding of vulnerable individuals becomes challenging, and since the impact of the disease in these groups is very high, the risk for this population remains **very high**. In addition, the number of hospitalised patients and severe cases will inevitably increase as some patients <65 years of age will also need hospitalisation and ICU care, although at lower proportions than older patients, with a consequent stress to healthcare provision.

The second sub-group includes countries with trends of high concern, i.e. with high or increasing notification rates in older cases and, consequently, an increased proportion of hospitalised and severe cases. In these countries, increasing or high death notification rates are already observed (as of 13 September, in Bulgaria, Croatia, Czechia, Hungary, Malta, Romania and Spain), or may be observed soon. In some local/regional areas of these countries, healthcare provision is already under pressure, with high hospital and ICU bed occupancy rates and high levels of fatigue among healthcare workers. The improvements that have been made in case management, supportive treatment and care are still not enough to avoid severe disease and death in a large proportion of vulnerable patients. Implementing stricter NPIs, which proved to be effective in controlling the epidemic in all EU/EEA countries and the UK in spring 2020, appears to be the only available strategy that may be able to ensure a moderate (as opposed to high) impact of the disease on individuals and on healthcare provision. Therefore, in these countries, even with a timely and strict implementation of NPIs, the overall **risk of COVID-19 is assessed as high** for the general population and **very high** for vulnerable individuals.

Update from 23 September

The epidemiological situation is rapidly evolving in many EU/EEA countries and the UK. As of 20 September 2020 (provisional data for week 38 extracted by ECDC on 23 September), Norway moved from the group with concerning trends to the group of countries with stable trends, while Belgium and Sweden moved from the group with stable trends to the group with concerning trends. The epidemiological situation of the 20 countries with concerning trends appears to be deteriorating with the majority of these countries now appearing to meet the criteria for classification as countries with high concerning trends, often because of an increase in the 14-day case notification rates in the older age groups (65-79 years old AND/OR 80 years or older).

Modelling

On 17 September, ECDC published 30 day forecasts of confirmed COVID-19 cases and associated hospital and ICU admissions and mortality [53]. These projections were made using a model that incorporates data on testing rates, NPIs over time and mask use. Of the nineteen countries with concerning trends, five (Czechia, Estonia, France, Hungary and Slovakia) were forecast to have the potential for a particularly steep resurgence in cases.

These were the countries that had lifted all national-level response measures in the period mid-May to late-June. Countries that had smaller outbreaks earlier in the pandemic may have lifted response measures earlier and therefore currently be at risk of higher levels of resurgence. Inference by the ECDC model shows that the rate of contact between people in these countries may have already returned to baseline levels [53] a suggestion which is supported by evidence from Google mobility data [54]. Although the number of contacts between people may be an important consideration for predicting transmission of the virus, it is also important to consider who is meeting whom and whether their encounter is protected by a facemask or similar protective measure.

Greece is not defined as a country with a trend of concern according to the ECDC criteria but has observed a strong increasing trend in ICU admissions. The ECDC model also highlights this country as having the potential for a large resurgence. Similarly, Latvia has seen a sustained increase in hospital admissions and is forecast to have the potential for a rapid resurgence.

Options for response

Data available to ECDC shows that 68% of COVID-19 cases detected in EU/EEA countries and the UK between weeks 34 and 37 were within 15-49 years of age. Increase of transmission in this age group also accounts for the majority of rapidly increasing trends observed in a number of Member States in the same time period. The current epidemiological situation poses a high risk of infection for older age groups, individuals with risk factors for severe COVID-19 disease, and healthcare workers particularly in primary care. Furthermore, although their extent, nature, and impact remain still largely unknown, there could be longer-term health sequelae among individuals experiencing a relatively mild clinical course, such as the many younger people currently being infected. Therefore, the current epidemiological situation in countries with concerning trends calls for targeted public health actions tailored at:

- controlling transmission among older children and adults younger than 50 years of age
- protecting medically vulnerable individuals
- protecting healthcare workers, particularly those involved in providing primary care

Controlling transmission among older children and adults younger than 50 years of age

To achieve this objective, public health authorities could:

- Identify settings where young people gather, where physical distancing cannot be guaranteed, and where correct and consistent face mask wearing is unlikely to happen. These high-risk settings can vary by country, region, socio-economic group, ethnicity, specific age group, culture, and other factors.
- Develop targeted communication campaigns to strengthen the application of preventive measures in such settings (at least physical distancing and correct and consistent wearing of face masks).
- Include communication messages on the importance of avoiding physical contact with older individuals, for example by promoting interactions with only the same people over time (social bubbles).
- Consider closing or regulating access to such high-risk settings in situations of widespread community transmission or when epidemiological data indicate sustained increasing incidence trends.

Protecting medically vulnerable individuals

Public health authorities should implement strategies to protect persons at risk of severe COVID-19 disease, including:

- Advise them to avoid crowded places both indoors and outdoors. This may include advice to telework, avoid using public transportation, particularly during rush hour, and avoiding mass gatherings particularly indoors.
- Instructions to correctly and consistently wear a face mask in all situations where contact with other people may occur.
- Implementation of stay-at-home advice/orders, if widespread transmission is occurring in the community they belong to.

Protecting healthcare workers

Healthcare workers are on the front-line of the management of the pandemic, regardless of the level of care they are providing. However, currently SARS-CoV-2 transmission is mostly occurring among individuals at low risk of hospitalisation and therefore healthcare workers in primary care are more likely to receive a high number of patients with respiratory symptoms. Therefore, in view of the expected increase of respiratory infections during the autumn and winter months, public health authorities should implement strategies to:

- Maintain a high level of awareness among healthcare personnel regarding the epidemiological situation in the areas where they operate.
- Ensure that clear protocols for the management of suspect cases in primary care are available for use and implemented in all such settings.
- Ensure that training is provided to primary care health personnel on the clinical presentation of COVID-19 (including non-respiratory symptoms).
- Ensure that primary care health personnel are clearly instructed on the use a medical face mask for all patient contacts at all times; appropriate PPE should be worn for the contact with patients with COVID-19 compatible symptoms, including when undertaking aerosol generating procedures (AGPs).
- Ensure that capacity for, and easy access to, COVID-19 diagnostic testing is available in primary care.

ECDC has published guidance for COVID-19 infection prevention and control for primary care, including general practitioner practices, dental clinics and pharmacy settings [55].

The ECDC Guidelines for the implementation of non-pharmaceutical interventions against COVID-19 [56] comprehensively details available options for NPis in various epidemiological scenarios, assesses the evidence for their effectiveness and addresses implementation issues including potential barriers and facilitators. The following chapter summarises the main NPI recommendations based on the current scientific evidence, including specific recommendations for scenarios of widespread transmission with possible pressure on healthcare systems.

Non-pharmaceutical interventions

Non-pharmaceutical interventions (NPI) are public health measures aimed at preventing and/or controlling SARS-CoV-2 transmission in the community. NPis can be applied at personal, population and environmental level, and they have played a critical role in reducing transmission rates and the impact of COVID-19. Until a safe and effective vaccine against COVID-19 is available to all those at risk of severe consequences, NPis will continue to serve as the main public health tool to control and manage SARS-CoV-2 outbreaks. However, several NPis can have a negative impact on the general well-being of people, the functioning of society, and the economy. Therefore, their use should be guided by the local epidemiological situation, with the overall goal of protecting the most vulnerable individuals in the society.

In areas where sustained SARS-CoV-2 control has been achieved as documented by comprehensive surveillance, NPis can be re-adjusted permitting an almost normal functioning of the society. In that (currently exceptional) epidemiological situation, travel restrictions from countries or areas with higher transmission would likely be a meaningful difference to the overall epidemiology of SARS-CoV-2 within the population.

In areas that are experiencing community transmission, the authorities should ensure that personal-level NPis are understood and correctly applied by the population. This includes NPis such as maintaining physical distance in all settings, hand and respiratory hygiene, and wearing face masks in all situations where physical distancing cannot be guaranteed. The use of face masks is recommended both indoors (e.g. supermarkets, shops and public transport) and in crowded outdoor settings. In addition, the use of face masks should be strongly recommended for groups at risk of developing severe complications (e.g. individuals in older age groups or having underlying conditions) and for occupations with extensive face-to-face contact with the public.

In areas experiencing widespread transmission with increasing hospitalisation rates, ICU admissions, or mortality, more strict measures at population- and/or environmental- level can be considered.

Table 1 summarises the NPI and propose indication for implementation during the pandemic based on the national/regional epidemiological situation.

Table 1. Non-pharmaceutical interventions and indications for implementation during the COVID-19 pandemic based on the national/regional epidemiological situation [56]

Non-pharmaceutical intervention	Low prevalence setting	High prevalence setting	Geo-level	Disease impact	Negative societal impact	Comment
Hygiene measures						
Meticulous hand and respiratory hygiene	+	+	National	High	Low	
Face masks						
Recommendation to use face mask in public spaces	+/-	+	National	High	Low	
Isolation and quarantine						
Recommended isolation of confirmed, probable and possible COVID-19 cases	+	+	National	High	Low	
Quarantine for contacts of cases	+	+	National	High	Low	
Quarantine of specific groups (e.g. travellers from a region or a country with high incidence of COVID-19).	+/-	+/-	National	Low	Low	Can be implemented, but: - Challenging to harmonise classification across countries and regions; - Administrative borders may not match epidemiologically relevant areas; - Questionable effectiveness when community transmission is ongoing across EU/EEA and the UK.
Physical distancing						
Recommended >2 metres physical distance between individuals in public places	+	+	National	High	Low	

Non-pharmaceutical intervention	Low prevalence setting	High prevalence setting	Geo-level	Disease impact	Negative societal impact	Comment
Closing of public spaces (e.g. non-essential shops, restaurants, entertainment venues)	-	+/-	Sub-national (preferably)	High	Medium	To consider at local/regional level first to minimise socio-economic disruption and political acceptability. To consider closing largest and most crowded spaces first.
Closing of public transport	-	+/-	Sub-national (preferably)	High	High	To consider at local/regional level first. To consider reducing capacity first.
Closing workplaces	-	+	Sub-national (preferably)	High	Medium	To consider at local/regional level first.
Recommending teleworking	+	+	National	High	Low	
Closing of schools (preschool, primary, secondary and tertiary)	-	+/-	Sub-national (preferably)	High	High	To consider, depending on pupils' age. Questionable effectiveness, especially in younger age-groups. To consider negative externalities.
Protecting high-risk groups and vulnerable populations	+/-	+	National	High	Medium	To also consider for hard-to-reach populations (e.g. testing in ethnic minorities or deprived populations).
Stay-at-home orders and recommendations	-	+/-	Sub-national (preferably)	High	High	To consider at local/regional level first to minimise socio-economic disruption and political acceptability.
Mass gatherings						
Interventions in place for public gatherings (small, medium and mass gatherings)	+/-	+	National	High	Medium	
Movement restrictions						
International travel restrictions	+/-	-	National	Low	High	May be considered in places with very low prevalence to limit introductions
National movement restrictions or recommendations	-	+	Sub-national	Medium	Medium	Prefer recommendation over restriction. To consider at local/regional level first, avoiding border closures.

+: recommended, +/- can be considered, -: not recommended

Supporting evidence for each measure is provided in the main text of the document [56].

Preparing for a scenario of widespread transmission with pressure on healthcare systems

Evolution of the epidemiological situation needs a local risk assessment and adaptive changes in response measures. The fifth Rapid Risk Assessment, produced by ECDC on 2 March 2020, outlined specific measures that should be considered for different epidemiological scenarios [57].

Several countries appear to be now progressing again from limited local community transmission towards sustained community transmission (localised outbreaks which start to merge and become indistinct; leading to sustained transmission in the country; and possibly increasing pressure on healthcare systems), and this needs a stronger approach, focused on both containment and mitigation measures. In this scenario, options for response involve promotion of various control measures, including specific physical distancing measures such as the cancellation of mass gatherings and measures in the workplace, as well as preparing healthcare services to meet potentially increased demands for the treatment of COVID-19 cases.

Geographic areas that did not experience widespread transmission during the first wave may have a higher level of susceptibility in the population and be less prepared to address the increasing demand for healthcare. Essential services, primary care facilities and hospitals should ensure appropriate surge capacity, bearing in mind that the demand could increase with the start of the influenza season. Therefore, public health efforts should focus on strengthening healthcare capacity to manage potentially high numbers of COVID-19 patients.

At the beginning of the pandemic in Europe, ECDC developed a checklist for hospitals preparing for the reception and care of coronavirus 2019 (COVID-19) patients [58] aiming to support hospital preparedness for the management of COVID-19 patients. The elements described in the list may need to be adapted to the specific characteristics of hospitals, the national health system, legislation and community where the hospital is located. The elements to be assessed include:

- establishment of a core team and key internal and external contact points
- human, material and facility capacity
- communication and data protection
- hand hygiene, personal protective equipment (PPE), and waste management
- triage, first contact and prioritisation
- patient placement, moving of the patients in the facility, and visitor access
- environmental cleaning.

For each area mentioned above, the elements or processes were identified and the items to be checked are listed in the ECDC 'checklist for hospitals preparing for the reception and care of coronavirus 2019 (COVID-19) patients' [58]. Further information can be found in the ECDC 'Health emergency preparedness for imported cases of high consequence infectious diseases' [59], in the WHO Hospital emergency response checklist [60] and Rapid hospital readiness checklist: harmonised health facility assessment modules in the context of the COVID-19 pandemic [61], and in the CDC Coronavirus Disease 2019 (COVID-19) Hospital Preparedness Assessment Tool [62].

Overall, COVID-19 remains a disease without specific treatment. Based on the experience of managing COVID-19 cases in spring 2020, new guidance has emerged advising management of respiratory distress [63] with preference to high-flow nasal cannula oxygen in patients with no indications for endotracheal intubation.

In addition, randomised clinical trials (RCTs) have produced evidence regarding pharmaceutical treatment for moderate and severe COVID-19 (e.g. no evidence for use of hydroxychloroquine [64]; evidence for the use of dexamethasone [65] and remdesivir [66,67] in moderate and severe cases; some evidence for the use of convalescent plasma) [68,69]. The European Commission is coordinating a number of joint procurements on pharmaceutical products.

Testing, isolation and contact tracing

ECDC's document on COVID-19 testing strategies and objectives is available to support Member States as they look to further strengthen their national, regional and local testing strategies [70].

Implementation of objective-driven and sustainable testing strategies for COVID-19 supports the overall public health response and helps mitigate impact on vulnerable individuals and healthcare systems, while ensuring that societies and economies can continue to function. Testing strategies should be flexible and rapidly adaptable to change, depending on the local epidemiology, transmission, population dynamics and resources.

Early identification of cases to ensure rapid isolation and the initiation of contact tracing remains important to prevent further spreading of the virus in the community. It is recommended that all persons with COVID-19 compatible symptoms are tested for SARS-CoV-2 as soon as possible after symptom onset [70]. People should be informed of the need to seek testing as soon as possible after symptom onset and testing should be easily accessible, including for visitors. Other populations can also be targeted for testing to monitor severity and trends, mitigate the impact of disease, identify clusters or prevent introduction of the virus into areas with sustained control.

Isolation of confirmed or probable cases of COVID-19 aims to separate sick from healthy persons to avoid further transmission. In a situation of widespread community transmission or when laboratory capacity is not sufficient to test everyone with symptoms, a blanket recommendation for individuals with symptoms to stay home may be given. Studies have shown that the viable virus may persist up to ten days after the onset of symptoms in mild-moderate cases and up to 20 days in severe and immunocompromised cases [71,72] ECDC has published a guidance for discharge and ending isolation in the context of widespread community transmission of COVID-19 [73].

All patients with acute respiratory symptoms in hospitals and other healthcare settings, especially individuals with underlying conditions and the elderly, and all specimens from sentinel primary care surveillance should be tested for both SARS-CoV-2 and influenza during the upcoming influenza season [74]. Multiplex RT-PCR assays can be considered for parallel testing.

Rapid contact tracing around confirmed cases, followed by quarantine, are central pillars for the public health response to reduce transmission at all stages of the epidemic. During widespread transmission, even if not all contacts of each case are traced, contact tracing still contributes to reducing the intensity of transmission when implemented in conjunction with other measures such as physical distancing. In countries or regions with low case numbers, contact tracing can help prevent a resurgence in cases. The key principles are outlined in the ECDC guidance on contact tracing [75] where information is available on how to scale up contact tracing [76].

If any contact (high-risk and low-risk exposure contacts) develops symptoms, speedy testing should be carried out. ECDC also recommends that high-risk exposure contact persons without symptoms, as well as low-risk exposure contacts without symptoms in special settings (e.g. nursing homes), are tested as soon as they have been traced, to enable early identification of any secondary cases among contacts and to start contact tracing of their contacts [70].

Based on the known incubation period of the virus, a duration of 14 days is advised for the quarantine of persons who have had contact with confirmed SARS-CoV-2 cases [77-81]. A test at day 10 after last exposure can be used to discontinue quarantine early if the test is negative [70]. Emerging evidence from modelling suggests that contacts could be tested and released even earlier from quarantine given certain criteria are met on the timeliness of the contact tracing process, although ending quarantine early has a residual risk which may not be acceptable in certain circumstances, for example in the context of vulnerable individuals [82].

Both nucleic acid amplification tests (NAATs) and antigen tests can be used to detect ongoing infection, and WHO's interim guidelines specify using a NAAT to confirm a COVID-19 case [83]. There are two types of tests used or in development: rapid molecular point of care tests and rapid antigen tests. The molecular point of care tests can generate rapid results with average sensitivity 95.2% (95% CI 86.7% to 98.3%) [84].

Rapid antigen tests are becoming more readily available and are being considered by Member States as a possible tool for rapid SARS-CoV-2 diagnosis. Whilst these tests are less sensitive than molecular assays, with an average sensitivity of 56.2% (95% CI 29.5 to 79.8%) [84], they offer the possibility of rapid, inexpensive and early detection of the most infectious COVID-19 cases (i.e. with high viral load) in appropriate settings [85]. Using rapid antigen tests, and depending on the individual test's performance, there is a substantial probability that the negative results are false negatives, while the positive results are very likely to be true positives. It is of essence that these assays are carefully validated for their intended use to ensure their accuracy and reliability to identify true infections. A meta-analysis of the clinical performance of commercial SARS-CoV-2 nucleic acid, antigen and antibody tests up to 22 August 2020 is available as a preprint [86]. WHO has published a guidance on: 'Antigen-detection in the diagnosis of SARS-CoV-2 infection using rapid immunoassays' [85]. ECDC is closely monitoring the latest developments in this area and liaising closely with partners and stakeholders, to provide guidance on the possible use of antigen assays in the diagnosis of SARS-CoV-2 infection. Information on specimen types and self-sampling can be found at the ECDC COVID-19 testing strategies and objectives [70].

Risk communication

Maintaining strong messaging to promote compliance with key protective behaviours

During the current resurgence of COVID-19 cases, risk communication messages should emphasise that the pandemic is far from over, and that the SARS-CoV-2 virus continues to circulate within the community throughout most of the EU/EEA. Since the introduction of safe and effective vaccines is likely to be several months away and treatment options remain limited, the overarching messages proposed by ECDC earlier in the pandemic remain valid: 'This is a marathon, not a sprint'; and 'We must not drop our guard' [1]. People's behaviour continues to be the key to controlling the pandemic.

It needs to be communicated that even if most cases are mild, there is an increasing evidence base regarding long-term effects from COVID-19 infection, which can also affect young adults and individuals with no underlying medical conditions who were not hospitalised [87]. Presenting experiences from such patients can be a compelling reminder that the disease is serious and should not be taken lightly.

Many initiatives using established risk communication methods have emerged over recent months, aimed at facilitating people's understanding of what they need to do in order to stay safe, and why. Among many others, these include the following examples:

- Colour- or number-coded phase levels, with clear justifications for either an escalation or a loosening of restrictions, as well as what each phase entails in terms of measures [88];
- Easily remembered messages based on (i) acronyms of key protective measures, such as Germany's 'AHA' (Abstand / distance; Hygiene/hygiene; Alltagsmasken/face masks) [89]; (ii) short phrases that summarise a rule in place, such as England's 'Rule of Six', which prohibits gatherings of more than six people [90]; and (iii) acronyms that summarise situations with higher risk of infection, such as the '3 Cs' – Crowded places, Close-contact settings, Confined and enclosed spaces [91].

Utilising behavioural insights to optimise risk communication

Behavioural research can facilitate an understanding of public attitudes, behaviour and beliefs. It can also show how behaviour may have changed over time [92]. This in turn can inform risk communication efforts, including for specific population groups. Such research has become particularly important as vocal opposition to the protective measures increases [93-96], and as people start to long for a return to a more 'normal' life [97]. A review of the findings from some recent national studies reveals some important insights from the specific countries:

- Respondents' perceptions of the probability that they will be infected has generally decreased over time (Sweden) [98];
- After a period of decline in support for the protective measures, support is now increasing sharply, in parallel with the current rise in infections (Netherlands) [99];
- Risk perception among the younger population has been fluctuating during the pandemic but is consistently lower than in older generations (Germany) [100].

Such findings can provide an important basis for developing effective risk communication materials.

Risk communication for younger people

Reduced compliance to protective measures by younger people has been reported alongside the above-mentioned lower levels of risk perception regarding COVID-19 [100]. This reversion by young people to behaviour and social mixing patterns that are traditionally common to their age group – and the consequent potential for them to act as vectors in the spread of COVID-19 to higher risk sections of the population – has become an increasing concern [101].

When developing COVID-19 risk communication material for younger people, it is important to bear in mind that, as with all population groups, they have been severely impacted by the pandemic. The OECD highlights the considerable challenges faced by young people in the fields of education, employment, mental health and disposable income, as well as the fact that youth and future generations will shoulder many of the long-term economic and social consequences of the crisis [102].

Communication campaigns specifically targeting young people have been developed in, for example, Spain [103] and France [104], and other countries may want to consider similar strategies. These should be based, if possible, on insights gained through behavioural research in order to ensure that the messages resonate with and are acceptable to the target population. It is essential that young people see themselves as part of the solution. Their involvement in strategies to control the pandemic and in the recovery effort is one of the primary keys to success [105].

Protecting mental health

The protection of mental health has been a key concern over the course of the pandemic. Loneliness caused by stay-at-home measures, worries about finances, and – in some cases – enforced proximity to an abuser has led to substantial increases in rates of depression and anxiety [106-108]. While the fall in COVID-19 cases over the summer months and the accompanying lifting of some restrictive measures may have provided respite, the ongoing return to high incidence rates and the consequent potential for a re-imposition of restrictive measures in some countries is likely to lead to renewed stresses. These may be exacerbated by the return of shorter, colder days, which make it difficult for people to socialise safely outside. Sustained efforts are therefore needed to promote mental health resilience during the pandemic: existing evidence and guidance on this is already available [109,110]. Digital health technologies, including the use of hotlines, can also be utilised to provide psychological support for people enduring mental health problems during periods of restrictive measures [111].

The mental health of people who have had COVID-19 is another issue of concern. There is evidence that COVID-19 patients can experience delirium, depression, anxiety, and insomnia when ill [112], but these conditions do not necessarily end once the initial physical symptoms have passed: one study of 402 former COVID patients found that, one month after physical recovery, 56% were still suffering from one or more of post-traumatic stress disorder, depression, anxiety, obsessive compulsive symptoms, or insomnia [113]. While it is not yet known how long these symptoms may continue, this is a potentially serious long term concern that needs attention, given the high psychiatric burden that such conditions can bring about at both the individual and community level.

Limitations

This assessment is undertaken based on information known to ECDC at the time of publication and has several key limitations.

Information on testing strategies for some EU countries was not available at the time of this assessment being published.

It is also important to consider the lag time between infection, symptoms, diagnosis, disease notification, death, and death notification that may be subject to biases, including changes in testing and reporting over time. The effects and impact of lifting or imposing response measures may take weeks to be reflected in the population's rates of disease.

Assessing the impact of response measures is complex as many countries have lifted or relaxed multiple measures simultaneously. Changes in individual behaviour, compliance with measures, and cultural, societal, and economic factors all play a role in the dynamics of disease transmission.

The data on NPIs are based on information available from official public sources and may not capture measures being taken by countries that are not reported on publicly available websites. There is substantial heterogeneity in physical distancing policies and their implementation between countries. The exact dates of introduction were often available from official sources but delays in their implementation may have occurred. Additionally, availability of public data from official government sources varies among countries. For some countries, data are no longer available on official websites concerning measures that are no longer in force, which may result in the data for more recent measures being more complete.

The 14-day notification rate of reported cases and deaths is dependent on data collected by ECDC's epidemic intelligence team. ECDC does not recommend using notification rates to directly compare countries. Caution is recommended whenever interpreting country data with small populations as small changes in reported cases can have a significant impact on the notification rates. It is important to understand any changes in testing practice within each country in order to be able to interpret the notification data

There are still gaps in knowledge on immunity and the longevity of the immune protection; a better understanding of these aspects will help address the pending questions on re-infection and vaccination.

Interpretation of estimates from sero-epidemiological studies should be done with caution as the representativeness of sample, testing methods and sampling timeframes used in these studies vary considerably.

Source and date of request

ECDC internal decision, 10 September 2020.

Consulted experts

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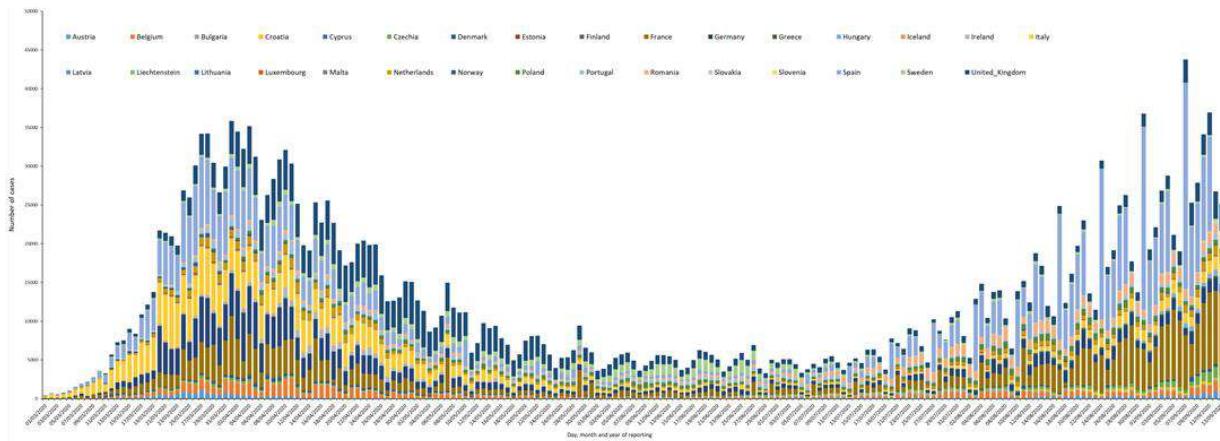
Disclaimer

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.

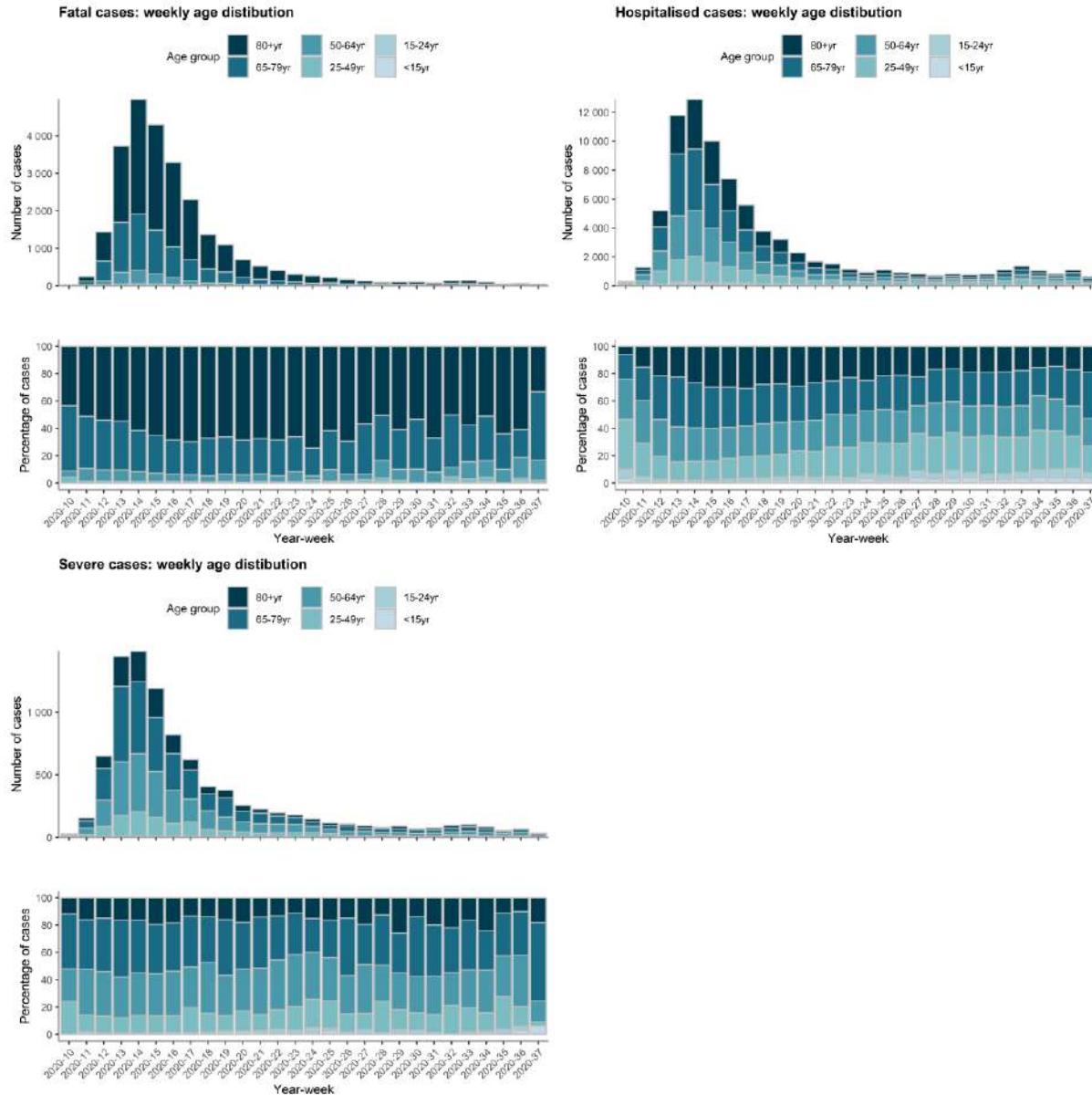
Annex 1. Distribution of new cases in the EU/EEA and the UK

Figure 1. Distribution of laboratory-confirmed of COVID-19 cases in EU/EEA and the UK, from 1 March to 13 September 2020



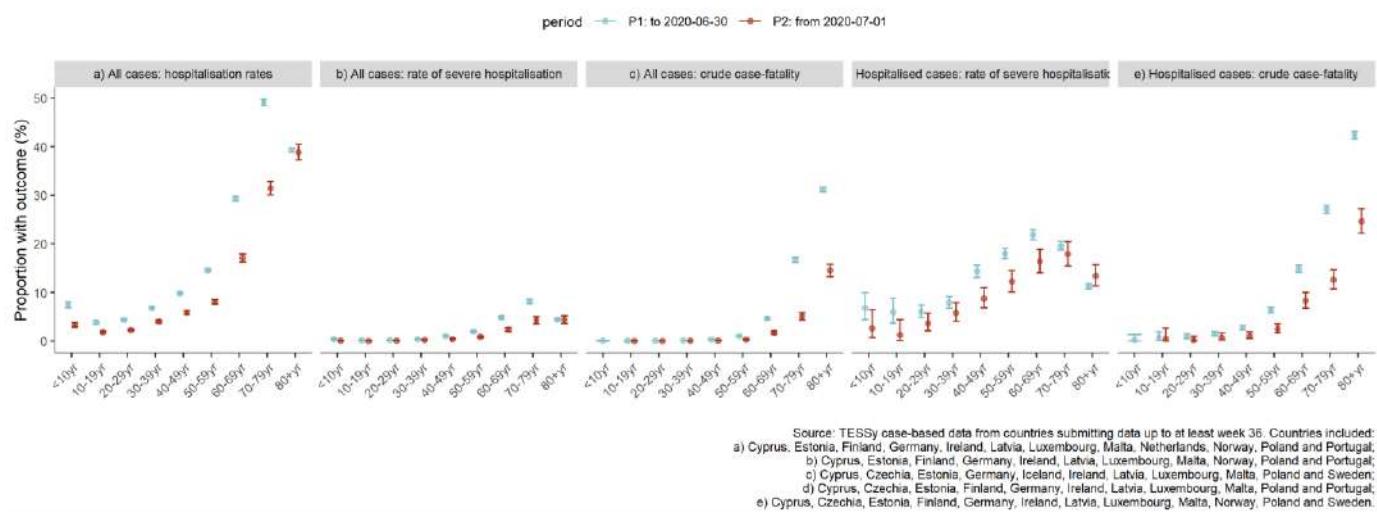
Annex 2. Age distribution of fatal, hospitalised and severe cases in the EU/EEA and the UK

Figure 1. Age distribution of COVID-19 fatal, hospitalised and severe cases reported in TESSy by week in 17 EU/EEA countries*, from 1 March to 13 September 2020



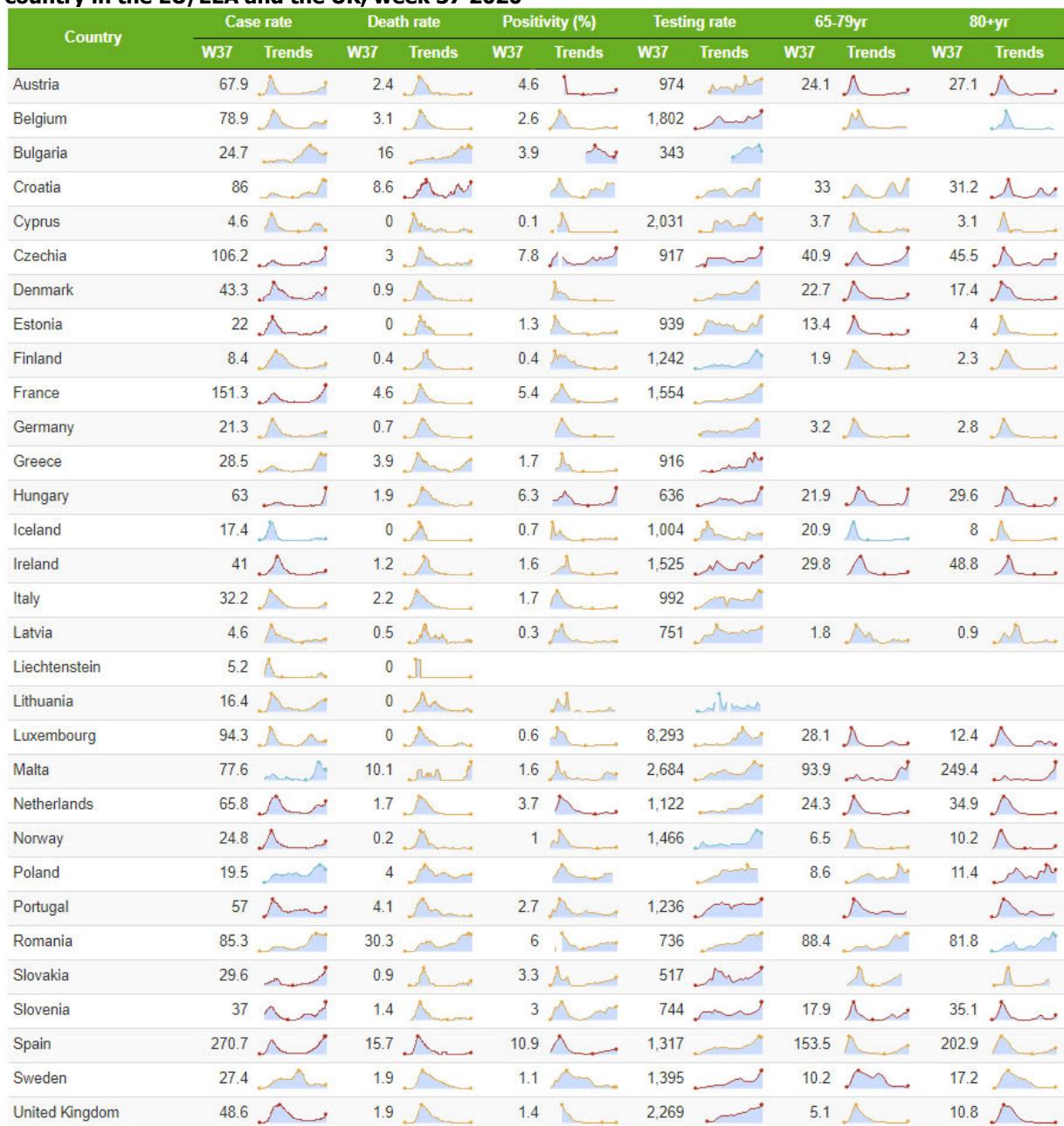
*Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, Germany, Iceland, Ireland, Latvia, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal and Sweden

Figure 2. Age distribution of COVID-19 cases reported in TESSy at different levels of severity, EU/EEA countries from 1 March to 13 September 2020



Annex 3. Epidemiological indicators for the EU/EEA and the UK.

Figure 1. 14-day case notification rates per 100 000 population, 14-day death notification rates per 1 000 000 population, test positivity, testing rate per 100 000 population, and age-specific rate notification rates per 100 000 population for the age groups 65-79 years old and 80 years or older by country in the EU/EEA and the UK, week 37 2020



Notes: colour of the sparkline denotes the trend in the indicator, based on a comparison of its value with that seven days earlier.

- Red – sustained increasing trend of at least one week duration;
- Orange - stable;
- Blue – decreasing trend.

Values in the column next to the sparkline are the current value for the indicator for the week shown. No value is shown where data for the most recent week are not available.

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Duration of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infectivity: When Is It Safe to Discontinue Isolation?

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Defining the duration of infectivity of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has major implications for public health and infection control practice in healthcare facilities. Early in the pandemic, most hospitals required 2 negative RT-PCR tests before discontinuing isolation in patients with Covid-19. Many patients, however, have persistently positive RT-PCR tests for weeks to months following clinical recovery, and multiple studies now indicate that these generally do not reflect replication-competent virus. SARS-CoV-2 appears to be most contagious around the time of symptom onset, and infectivity rapidly decreases thereafter to near-zero after about 10 days in mild-moderately ill patients and 15 days in severely-critically ill and immunocompromised patients. The longest interval associated with replication-competent virus thus far is 20 days from symptom onset. This review summarizes evidence-to-date on the duration of infectivity of SARS-CoV-2, and how this has informed evolving public health recommendations on when it is safe to discontinue isolation precautions.

Keywords. SARS-CoV-2; COVID-19; transmission-based precautions; isolation.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes Covid-19, has infected millions of people worldwide. Understanding the duration of SARS-CoV-2 infectivity has major implications for public health and infection control efforts. Prematurely releasing patients from isolation risks fueling transmission. Unnecessarily prolonging isolation, however, is frustrating for patients, consumes personal protective equipment, can delay procedures and other medical care, locks up scarce private and airborne infection isolation rooms, separates patients from social support, and may impede discharge. Policies that permit a timely but safe return to work for infected healthcare workers are also critical, particularly in hospitals facing staffing shortages. Furthermore, repeated RT-PCR testing for clearance consumes testing supplies and repeated nasopharyngeal swabs can cause nontrivial discomfort.

In this article, we review the current knowledge about the duration of SARS-CoV-2 transmissibility and how this has informed evolving recommendations from the World Health Organization (WHO) and U.S. Centers for Disease Control and Prevention (CDC).

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INCUBATION PERIOD AND PEAK VIRAL LOAD

The median incubation period for SARS-CoV-2 is 4–5 days, with an interquartile range of 2–7 days [1, 2]. Approximately 98% of infected individuals who develop symptoms do so within 12 days [3]. Viral RNA levels are detectable in the respiratory tract 2–3 days before symptoms appear, peak at symptom onset, and decline over the following 7–8 days in most patients [4–8]. The capacity of asymptomatic and presymptomatic people to transmit virus prior to symptom onset is well documented [9–13]. SARS-CoV-2 therefore appears to have similar transmission dynamics to influenza, which is also contagious before and through several days after symptom onset [14–16].

DURATION OF PCR POSITIVITY

Early in the pandemic, WHO and CDC recommended test-based clearance with at least two negative RT-PCR tests for patients with Covid-19. This strategy, however, can lead to prolonged isolation, as some patients have positive RT-PCR assays for weeks if not months [17–22]. Sicker patients tend to have detectable RNA for longer periods, but prolonged PCR positivity also occurs in mildly ill and asymptomatic individuals [6, 8, 23–28]. The duration of PCR positivity appears to be longer in lower respiratory tract versus upper respiratory tract samples, as well as in stool samples [26, 29–32]. In addition, some patients recover from Covid-19, have two negative tests, and then test positive again even in the absence of new symptoms [33, 34].

INTERPRETING PCR TEST RESULTS: CYCLE THRESHOLDS AND NUCLEIC ACID QUANTITY

While PCR tests are reported as a binary result, the cycle threshold (C_t) value—the number of PCR cycles required for the sample fluorescence to exceed a predefined threshold—provides additional useful information. The C_t value is inversely related to the amount of nucleic acid present in the sample, such that every increase in C_t value of ~3.3 corresponds to a 10-fold reduction in the amount of nucleic acid [35]. Most SARS-CoV-2 PCR assays use a C_t cutoff of <40 for positivity. Patients in the early stages of infection usually have C_t values of 20–30 or less [36]. C_t values tend to increase thereafter, reflecting progressively lower amounts of viral RNA as the immune response clears the infection.

C_t values must be interpreted with caution as they do not reflect a true viral load, which requires standardization using reference curves. As such, they are not directly comparable across assays [37]. Furthermore, differences in specimen collection quality and reaction conditions can introduce further variation [38, 39]. This imprecision in PCR testing is most apparent when the amount of viral nucleic acid at the sampling site approaches the limit of detection for the assay and is the most common reason for why some patients alternate between testing negative and testing positive. Lastly, only traditional real-time PCR assays produce a C_t value; assays that use isothermal amplification do not produce a C_t value and nested PCR assays are not designed for quantitative interpretation [40].

ASSESSING DURATION OF INFECTIVITY BY CELL CULTURE

It is now clear that persistent RNA detection does not necessarily translate into viable virus that can infect others. Subgenomic RNA fragments associate tightly with intracellular vesicles that protect them from degradation by host enzymes, which may explain why PCR tests are persistently positive in many patients [41]. The ability of SARS-CoV-2 to replicate in cultured cells is a better surrogate for infectivity. In a hamster study, for example, transmissibility of SARS-CoV-2 correlated with detection of infectious virus by culture, but not by RT-PCR positivity alone [42]. The possibility of human transmission despite nonculturable virus cannot be ruled out, since no study has attempted to link the presence of culturable virus directly to infectivity in humans. However, an increasing body of evidence suggests that time from symptom onset and C_t values are both useful proxies for infectivity. Notably, SARS-CoV-2 viral culture is not used in routine practice, as it can only be performed by specialized laboratories that meet minimum standards for biosafety.

Table 1 summarizes the evidence that persistently positive SARS-CoV-2 RNA PCRs are due to residual viral “debris” rather than replication-competent virus. The first study to make

this suggestion was an analysis of 9 hospitalized patients with mild-moderate disease [6]. RNA was detectable by PCR for weeks after onset of symptoms in some patients; however, virus was only isolated by culture during the first week of symptoms and could not be cultured from any samples taken >8 days following symptom onset.

Likewise, the US CDC reported they have not been able to isolate culture replication-competent virus from patients >9 days from symptom onset [43]. These data were generated from adult patients spanning a range of ages and severities of illness, although CDC did not specify the number of patients in their analysis. Attempts to culture virus from upper respiratory specimens were unsuccessful when PCR C_t values were higher than 35 (ie, a low but detectable range of viral nucleic acid). C_t values from upper respiratory specimens were high following recovery from clinical illness, suggesting viral debris rather than replication-competent virus. Lastly, the CDC reported that they have not cultured infectious virus from urine or from feces, suggesting these sources pose minimal risk of transmission, particularly following hand hygiene. Note, however, that investigators have been able to culture infectious virus from feces in at least one patient [52].

Similar results were reported in two studies from Southern France that retrospectively examined the effect of hydroxychloroquine and azithromycin on clinical and virologic outcomes [45, 46]. In the first analysis, 183 PCR-positive samples (including 174 nasopharyngeal swabs and 9 sputum) from 155 patients were inoculated in cell cultures, of which 129 led to successful isolation [45]. Samples with C_t values of 13–17 were all associated with positive viral cultures. The culture positivity rate steadily decreased with rising C_t values, and no virus was successfully cultured from samples with C_t values ≥ 34 . PCR tests were positive for up to 20 days after symptom onset, but viable virus could not be cultured after day 8. In the second analysis, 11 patients in whom daily cultures were attempted were negative by day 10 [46].

Canadian investigators provided similar results from an analysis of 90 PCR-positive samples, including nasopharyngeal swabs and endotracheal aspirates, taken through 21 days after symptom onset [47]. Virus could not be cultured after 8 days from symptom onset or when C_t values were greater than 24. The probability of successfully culturing SARS-CoV-2 was highest between days 1–5 and peaked at day 3. Every unit increase in C_t value was associated with a decrease in the odds of successfully culturing virus by 32%.

In an analysis of hospitalized patients with Covid-19 in Singapore, viral culture was positive from respiratory samples in 14 of 73 patients [44]. Viral culture was unsuccessful in all samples with C_t values >30, and 90% of samples taken after day 14 from symptom onset had C_t values >30.

A study from the Netherlands specifically focused on patients with severe illness, including immunocompromised

Table 1. Summary of Studies Assessing Duration of SARS-CoV-2 Infectivity Based on Viral Cell Culture or Secondary Infection Rates

Study (Country)	Population	Primary findings
Wolff et al. [6] (Germany)	9 young to middle-aged patients with mild disease	<ul style="list-style-type: none"> Peak viral load prior to day 5 after symptom onset Virus unable to be cultured after day 8 from respiratory samples despite ongoing high viral load Virus unable to be cultured from stool, even with high viral load
U.S. Centers for Disease Control and Prevention [43] (U.S.)	Per CDC, data generated from adults across a variety of age groups and with varying severity of illness (unspecified number of patients)	<ul style="list-style-type: none"> Virus unable to be cultured more than 9 days after symptom onset Attempts to culture virus from upper respiratory specimens largely unsuccessful when Ct values >33–35 Among patients who continue to have detectable RNA in upper respiratory specimens following clinical illness, concentrations are generally in the range at which replication-competent virus has not been reliably isolated
Young et al. [44] Singapore	100 hospitalized patients (20 requiring supplemental oxygen and 12 requiring mechanical ventilation	<ul style="list-style-type: none"> Viral culture unsuccessful in all PCR-positive samples with Ct values >30 90% of all samples taken after day 14 from symptom onset had Ct values >30
La Scola et al. [45] (France)	183 PCR-positive samples (174 nasopharyngeal, 9 sputum) from 155 patients (unknown severity of illness)	<ul style="list-style-type: none"> PCR tests positive for up to 20 days after symptom onset, but virus unable to be cultured after day 8 Samples with CT values 13–17 all led to positive culture No virus was successfully cultured when Ct values were ≥34
Million et al. [46] (France)	11 hospitalized PCR-positive patients in whom daily cultures were attempted past 10 days	<ul style="list-style-type: none"> Virus unable to be cultured after day 8 from symptom onset, or when Ct values were >24 Probability of culturing virus highest between days one and five and peaked on day 3 Each 1 unit increase in Ct value correlated with 32% decrease in odds of culturing virus
Bullard et al. [47] (Canada)	90 PCR-positive nasopharyngeal or endotracheal aspirate samples taken through day 21 after symptom onset (unknown number of patients and severity of illness)	<ul style="list-style-type: none"> PCR positive through day 63 after symptom onset, but virus unable to be cultured after 18 days Median duration of infectious shedding by viral culture = 8 days after symptom onset (IQR 5–11 days, maximum 20 days) Probability of obtaining infectious virus fell to <5% after 15 days from symptom onset Detection of viral RNA by PCR exceeded detection by culture
Liu et al. [25] (Taiwan)	1 PCR-positive patient with mild febrile illness	<ul style="list-style-type: none"> •
van Kampen et al. [48] (Netherlands)	690 upper and lower respiratory samples taken from 129 hospitalized patients with severe or critical illness, including 30 immunosuppressed patients	<ul style="list-style-type: none"> • Median duration of infectious shedding by viral culture = 8 days after symptom onset (IQR 5–11 days, maximum 20 days) • Probability of obtaining infectious virus fell to <5% after 15 days from symptom onset • Amongst 2761 close contacts, secondary attack rate was 0.7% amongst 1818 people who had contact within 5 days of symptom onset and 0% amongst 852 people who had contact ≥6 days after symptom onset • Viral cell culture and full-length genome sequencing unsuccessful in all cases
Cheng et al. [49] (Taiwan)	100 patients with Covid-19 (mostly mild disease)	<ul style="list-style-type: none"> •
Lu et al. [50] (China)	87 patients hospitalized with Covid-19, discharged after recovery and 2 consecutive negative PCR swabs, and then tested positive again within 2 weeks	<ul style="list-style-type: none"> •
Korean Centers for Disease Control and Prevention [51] (South Korea)	285 patients who recovered from Covid-19, tested negative, and then tested positive again by PCR (on average 45 days after initial symptom onset)	<ul style="list-style-type: none"> • Viral cell culture negative in 108 cases • Ct values for re-positive tests >30 in 89.5% of cases • 0% transmission to 790 contacts during re-positive period

patients [48]. Of the 129 patients in the study, 69% were in intensive care units, 31% were in noncritical care units (most of whom required supplemental oxygen), 23% and were immunosuppressed. The investigators tested 690 upper and lower respiratory samples at various time points for viable virus using cell culture; 23 of the 129 patients (17.8%) had replication-competent virus. The median interval of infectious shedding by culture was 8 days after symptom onset (interquartile range 5–11). The maximum interval from symptom onset associated with viable virus was 20 days (occurring in one patient); unfortunately, the clinical characteristics and illness trajectory of this patient were not reported. The median viral load was significantly higher in culture-positive samples than culture-negative samples, and the probability of detecting replication-competent virus was <5% after 15 days from symptom onset.

Although the duration of infectivity is generally longer in severe illness, outliers may be possible. One case report from Taiwan, for example, noted infectious shedding by viral cell culture in the sputum 18 days after symptom onset in a patient with a mild febrile illness [53]. In addition, effective antiviral therapy is associated with a shorter time to negative SARS-CoV-2 viral load, although its impact on transmissibility has not yet been established [54].

EPIDEMIOLOGICAL DATA ON TRANSMISSIBILITY

The data on duration of viral recovery in cell culture following symptom onset are mirrored by data on transmission rates. In a prospective study conducted in Taiwan, 100 confirmed Covid-19 cases and their contacts were identified and the secondary clinical attack rate was measured for different time intervals from symptom-onset [49]. There were 2761 close contacts of the 100 cases; the secondary attack rate was 0.7% amongst the 1818 people with contact with case patients within 5 days of symptom onset and 0% amongst the 852 people with contact >5 days after symptom onset. As with other studies, attack rates were highest among household and family contacts (~5%) and substantially lower amongst healthcare contacts (0.9%). Notably, though, only 6 of the confirmed index cases had severe disease; the 786 close contacts of these severely ill patients were about 4 times more likely to acquire infection compared to the 1097 close contacts of 56 patients with mild disease.

SIGNIFICANCE OF PATIENTS WHO TEST PCR-POSITIVE AFTER TESTING NEGATIVE

Investigators from Guangdong Province, China, analyzed 619 hospitalized patients with Covid-19 who were discharged after resolution of fever, improvement in respiratory symptoms, and 2 consecutive negative PCR samples >24 h apart on both respiratory tract and gastrointestinal tract samples [50]. All discharged cases were isolated in designated hotels, kept in observation, and retested on days 7 and 14 after recovery. 87 patients (14.1%)

tested positive, of whom 77 were asymptomatic and 10 had mild cough. Viral cell culture was unsuccessful in all cases; furthermore, full-length genomes could not be sequenced in any cases, suggesting genome degradation.

Similarly, the Korean CDC reported on epidemiologic and contact tracing for 285 patients who recovered from Covid-19, tested negative, and then tested positive again by PCR [51]. On average, the re-positive test occurred 45 days after initial symptom onset (range 8–82 days). Retesting was done in 37.5% of patients because of new symptoms such as cough or sore throat. Viral cell culture testing was done in 108 re-positive cases, and all were negative. PCR Ct values were >30 in 89.5% of cases, suggesting that the negative-to-positive phenomenon represents sampling variability near the assay limit of detection. None of 790 contacts of the 285 re-positive cases (including 351 family members) developed Covid-19.

DEGREE AND DURATION OF IMMUNITY FOLLOWING INFECTION

An important question is to what degree individuals who have recovered from Covid-19 are vulnerable to SARS-CoV-2 re-infection and how long immunity might last. Animal studies demonstrate that infection provides at least short-term immunity. One group of investigators experimentally infected 9 rhesus macaques with SARS-CoV-2, after which all developed neutralizing antibodies [55]. When the monkeys were re-challenged with the same viral dose 35 days later, all demonstrated anamnestic immune responses, with lower nasal viral RNA levels and more rapid declines in viral RNA compared to the initial challenge and compared to control monkeys. A separate study conducted in China using 7 rhesus macaque monkeys demonstrated similar findings [56]. Monkeys were infected and underwent a mild-to-moderate course of disease. Four of the seven macaques were re-challenged 28 days later; none showed any clinical signs of disease, viral dissemination, or histopathological changes on necropsy.

In humans, several cases of re-infection with SARS-CoV-2 have now been confirmed using whole genome sequencing. Although the true incidence of re-infection shortly after an initial infection is unknown, it is likely rare. As described above, most obsolete reports of recurrent positive PCR tests likely reflect residual RNA with high Ct values. Small case series in humans also suggest that neutralizing antibodies develop in most patients following recovery from Covid-19, and that titers correlate with severity of illness and the number of virus-specific T-cells [5, 6, 57–60]. However, in one study of 74 patients with symptomatic and asymptomatic infection, most demonstrated a decrease in IgG levels and neutralizing antibodies within 2–3 months after infection; 40% of asymptomatic individuals became seronegative in the early convalescent phase, compared to 12.9% of symptomatic patients [61]. Another study demonstrated an IgG half-life of 73 days in patients with mild illness

[62]. It is unclear, however, whether and to what extent the decrease in measurable antibody levels correlates with loss of functional immunity.

SUMMARY AND IMPLICATIONS FOR PUBLIC HEALTH RECOMMENDATIONS

In summary, based on a rapidly expanding evidence base, we currently draw the following conclusions regarding the timing and duration of SARS-CoV-2 transmissibility (Figure 1):

1. SARS-CoV-2 is most contagious right before and immediately following symptom onset.
2. Contagiousness rapidly decreases to near-zero after about 10 days from symptom onset in mild-moderately ill patients and 15 days in critically ill and immunocompromised patients. The longest duration of viral viability that has been reported thus far is 20 days from symptom onset.
3. Persistently positive SARS-CoV-2 RNA PCRs in recovered patients are common but are generally associated with high Ct values, reflecting low viral loads. These do not indicate replication-competent virus and are not associated with contagiousness.
4. PCR assays that alternate between positive and negative results in patients who have recovered from Covid-19 most likely reflect sampling variability and low levels of viral debris at the borderline of detection. These patients are unlikely to be contagious.
5. Infection confers at least short-term immunity in most cases; however, the duration of immunity is unclear and several cases of re-infection have now been confirmed.

These data have informed evolving national and international public health recommendations (Table 2). WHO, for example, initially recommended 2 negative PCR results on sequential samples taken >24 h apart in clinically recovered patients before

discontinuing isolation. On May 27, WHO shifted to recommending isolation for 10 days after symptom onset, plus at least 3 additional days without symptoms [63]. In asymptomatic patients, WHO recommends discontinuing isolation 10 days after the positive PCR test. WHO still allows providers the option of using serial negative tests to clear patients but acknowledges that some patients have prolonged viral RNA detection by PCR that does not correlate with infectivity.

In July and August, CDC modified their guidance to a more nuanced approach based on severity-of-illness and immunocompetence [64]. Specifically, while CDC still recommends 10 days of isolation from symptom onset (including >24 h since resolution of fever and improvement in symptoms) for mild-moderately ill patients without severely immunocompromising conditions, they now recommend at least 10 days and up to 20 days for patients with severe-critical illness or severely immunocompromising conditions. For asymptomatic patients, 10 days is recommended from the first positive PCR test (and up to 20 days for severely immunocompromised patients). Moreover, CDC recommends avoiding test-based clearance given the evidence that people with persistently positive PCR tests are not contagious. Test-based clearance should be reserved for rare cases when there is a need to discontinue isolation early, or potentially to inform a decision to prolong isolation for severely immunocompromised patients.

ROLE OF PCR TESTING AFTER CLINICAL RECOVERY

CDC now recommends that patients who have recovered from Covid-19 and remain asymptomatic should not be re-tested within 3 months after symptom onset, even if they had close contact with another infected person [43]. This is based on observations that persons infected with related endemic human betacoronaviruses become susceptible to reinfection after about 90 days, and therefore a positive SARS-CoV-2 PCR test within 90 days of an initial infection most likely

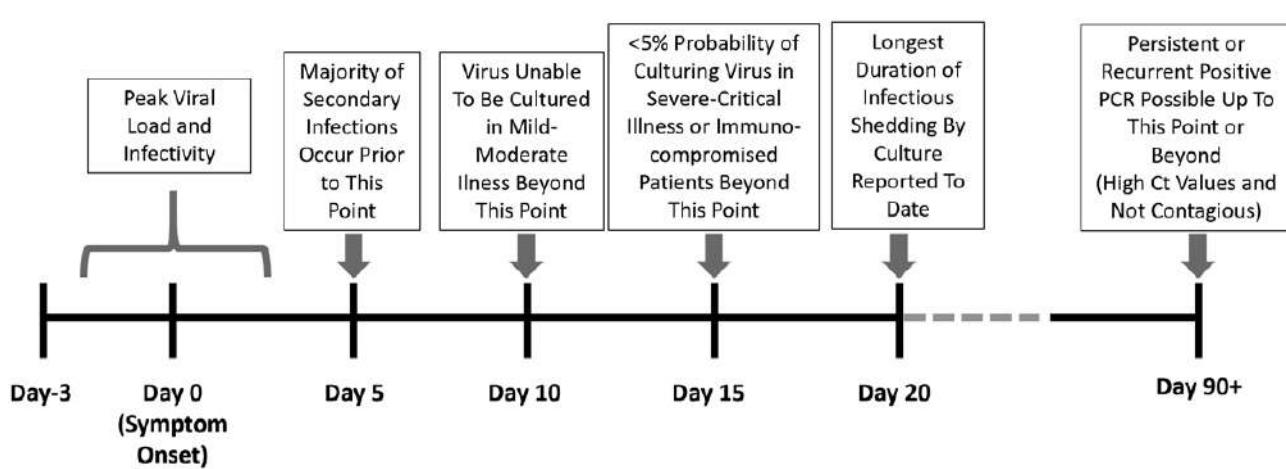


Figure 1. Summary of timeline of SARS-CoV-2 infectivity.

Table 2. WHO and CDC Guidance for Discontinuing Isolation in Patients with Confirmed Covid-19 Infection and Approach to Persistent or Recurrent Positive PCR Tests

Category	WHO	CDC
Symptomatic, initial infection	<ul style="list-style-type: none"> • 10 days after symptom onset, plus • At least 3 additional days without symptoms (fever or respiratory symptoms) 	<ul style="list-style-type: none"> • <i>Mild-moderate Illness, Not Severely Immunocompromised:</i> 10 days since symptom onset + 24 h since last fever + improvement in symptoms • <i>Severe-critical Illness OR Severely Immunocompromised:</i> At least 10 days and up to 20 days since symptom onset + 24 h since last fever + improvement in symptoms
Asymptomatic, initial infection	<ul style="list-style-type: none"> • 10 days after positive test 	<ul style="list-style-type: none"> • <i>Not Severely Immunocompromised:</i> 10 days since first positive test • <i>Severely Immunocompromised:</i> At least 20 days and up to 20 days since first positive test
Recovered from Covid-19 but persistent or recurrent PCR positive	<ul style="list-style-type: none"> • No specific recommendation 	<ul style="list-style-type: none"> • <i>Asymptomatic:</i> Retesting not recommended within 3 months after date of symptom onset, even if the patient has close contact with an infected person. • <i>Symptomatic:</i> If new symptoms develop within 3 months of initial symptom onset, and alternative etiology cannot be identified, consider retesting. Isolation may be considered in consultation with infectious disease or infection control experts, especially if symptoms developed within 14 days after close contact with an infected person.

Note: WHO also allows for a test-based strategy to discontinue isolation based on clinical recovery and 2 sequential negative PCR tests >24 h apart. CDC no longer recommends a test-based strategy, except to discontinue isolation earlier than outlined by the time-based strategy, or possibly in persons who are severely immunocompromised (in consultation with infectious disease experts).

CDC definitions (severity of illness criteria adapted from the NIH COVID-19 Treatment Guidelines [<https://www.covid19treatmentguidelines.nih.gov/overview/management-of-covid-19/>]):

- Mild Illness: Individuals who have any of the various signs and symptoms of COVID-19 (eg, fever, cough, sore throat, malaise, headache, muscle pain) without shortness of breath, dyspnea, or abnormal chest imaging.
- Moderate Illness: Individuals who have evidence of lower respiratory disease by clinical assessment or imaging, and a saturation of oxygen (SpO_2) ≥94% on room air at sea level.
- Severe Illness: Individuals who have respiratory frequency > 30 breaths per minute, SpO_2 <94% on room air at sea level (or, for patients with chronic hypoxemia, a decrease from baseline of >3%), ratio of arterial partial pressure of oxygen to fraction of inspired oxygen ($\text{PaO}_2/\text{FiO}_2$) <300 mmHg, or lung infiltrates >50%
- Critical Illness: Individuals who have respiratory failure, septic shock, and/or multiple organ dysfunction.
- Severely Immunocompromised: chemotherapy for cancer, untreated HIV infection with CD4 T lymphocyte count <200, combined primary immunodeficiency disorder, and receipt of prednisone >20mg/day for more than 14 days.

represents persistent viral debris rather than reinfection. For new symptoms potentially consistent with COVID-19 that develop within 3 months and are not clearly attributable to another diagnosis (such as influenza), CDC states that isolation may be warranted while evaluating for possible SARS-CoV-2 reinfection, in consultation with an infectious disease or infection control expert.

The optimal approach for isolating asymptomatic patients who test positive again >90 days from the original infection (for example, as part of a contact tracing investigation, or during routine screening upon admission to a healthcare facility) remains uncertain. This phenomenon, in our experience, is not uncommon, and most of these patients have high PCR Ct values suggestive of residual viral debris. We believe that the decision to isolate should be made on a case-by-case basis in consultation with infectious disease/infection control experts and/or local public health authorities, taking into account the patient's medical history, time from initial positive test, PCR Ct value, and immune status. Given the uncertainty regarding duration of immunity and reports of confirmed SARS-CoV-2 re-infection in some patients, we believe it is prudent at this time to test all recovered patients who develop new symptoms > 3 months after initial infection and to isolate them if the PCR test is positive.

CONCLUSIONS

Much progress has been made in understanding the transmission dynamics of SARS-CoV-2 and duration of infectivity. WHO

and CDC have modified their recommendations in response to data indicating that infectivity decreases to essentially zero after about 10 days from symptom onset in mild-moderately ill patients and after about 15 days in critically ill and immunocompromised patients, with a maximum reported interval thus far of 20 days. Additional data confirming these findings in larger and more diverse cohorts are needed to provide further reassurance as to the safety of discontinuing isolation for critically ill, deeply immunocompromised, and otherwise high-risk patients, and to define the optimal approach to retesting and isolation in patients who have recovered from Covid-19.

Notes

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Considerations for quarantine of contacts of COVID-19 cases

Allegato 3

Interim guidance

19 August 2020



This document is an update of interim guidance entitled Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19), published on 19 March 2020. This version is restricted to the use of quarantine for contacts of confirmed or probable cases of COVID-19. It provides updated guidance for the implementation of quarantine, as well as additional guidance on ventilation and on the care of children in quarantine. The update is based on evidence on controlling the spread of SARS-CoV-2, the virus that causes COVID-19, and scientific knowledge of the virus.

Background

As the COVID-19 pandemic continues to evolve, Member States need to implement a comprehensive set of public health measures that are adapted to the local context and epidemiology of the disease. The overarching goal is to control COVID-19 by slowing down transmission of the virus and preventing associated illness and death.¹

Several core public health measures that break the chains of transmission are central to this comprehensive strategy, including (1) identification, isolation, testing, and clinical care for all cases, (2) tracing and quarantine of contacts, and (3) encouraging physical distancing of at least 1 metre combined with frequent hand hygiene and respiratory etiquette. These three components should be central to every national COVID-19 response.²

Quarantine means “the restriction of activities and/or separation from others of suspect persons (...) who are not ill in such a manner as to prevent the possible spread of infection or contamination.”³ The use of quarantine to control infectious diseases has a long history that goes back centuries. Today, many countries have the legal authority to impose quarantine which, in accordance with Article 3 of the International Health Regulations (2005), must be fully respectful of the dignity, human rights and fundamental freedoms of persons.⁴

There are two scenarios in which quarantine may be implemented: (1) for travellers from areas with community transmission and (2) for contacts of known cases. This document offers interim guidance to Member States on implementing quarantine, in the latter scenario, for the contacts of people with probable or confirmed COVID-19. Thus, this guidance is intended for national authorities responsible for their local or national policy on the quarantine of contacts of confirmed or probable COVID-19 cases⁵ and for ensuring adherence to infection prevention and control (IPC) measures.

As mentioned, quarantine may also be used in the context of travel and is included within the legal framework of the International Health Regulations (2005),³ specifically:

- Article 30 – Travellers under public health observation;
- Article 31 – Health measures relating to entry of travellers;
- Article 32 – Treatment of travellers.³

Member States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to legislate and to implement legislation, in pursuit of their health policies, even when such legislation that restricts the movement of individuals.

The use of quarantine in the context of travel measures may delay the introduction or re-introduction of SARS-CoV-2 to a country or area, or may delay the peak of transmission, or both.^{6,7} However, if not properly implemented, quarantine of travellers may create additional sources of contamination and dissemination of the disease. Recent research shows that, when implemented in conjunction with other public health interventions, quarantine can be effective in preventing new COVID-19 cases or deaths.⁷ If Member States choose to implement quarantine measures for travellers on arrival at their destination, they should do so based on a risk assessment and consideration of local circumstances.⁶

The scope of this interim guidance document, therefore, is restricted to the use of quarantine for contacts of confirmed or probable cases of COVID-19.

Policy considerations for the quarantine of contacts of COVID-19 cases

In the context of COVID-19, the quarantine of contacts is the restriction of activities and/or the separation of persons who are not ill, but who may have been exposed to an infected person.³ The objective is to monitor their symptoms and ensure the early detection of cases. Quarantine is different from isolation, which is the separation of infected persons from others to prevent the spread of the virus.

Before implementing quarantine, countries should communicate why this measure is needed, and provide appropriate support to enable individuals to quarantine safely.

- Authorities should provide people with clear, up-to-date, transparent and consistent guidance, and with reliable information about quarantine measures.
- Constructive engagement with communities is essential if quarantine measures are to be accepted.

- Persons who are quarantined need access to health care as well as to financial, social and psychosocial support; protection; as well as to support to meet their basic needs, including food, water, hygiene, communication and other essentials for themselves and for household members and children who they are supporting or caring for. The needs of vulnerable populations should be prioritized.
- Cultural, geographic and economic factors affect the effectiveness of quarantine. Rapid assessment of the local context should evaluate both the drivers of success and the potential barriers to quarantine, and they should be used to inform plans for the most appropriate and culturally accepted measures.

Who should be quarantined

In the context of the current COVID-19 outbreak, WHO recommends the rapid identification of COVID-19 cases and their isolation and management either in a medical facility⁸ or an alternative setting, such as the home.⁹

WHO recommends that all contacts of individuals with a confirmed or probable COVID-19 be quarantined in a designated facility or at home for 14 days from their last exposure.

A contact is a person in any of the following situations from 2 days before and up to 14 days after the onset of symptoms in the confirmed or probable case of COVID-19:

- face-to-face contact with a probable or confirmed case of COVID-19 within 1 meter and for more than 15 minutes;
- direct physical contact with a probable or confirmed case of COVID-19
- direct care for an individual with probable or confirmed COVID-19 without using proper personal protective equipment;¹⁰ or
- other situations, as indicated by local risk assessments.⁵

Recommendations for implementing quarantine

If a decision to implement quarantine is taken, the authorities should ensure that:

1. adequate food, water, protection, hygiene and communication provisions can be made for the quarantine period;
2. the infection prevention and control (IPC) measures can be implemented;
3. the requirements for monitoring the health of quarantined persons can be met during quarantine.

These measures apply to both quarantine in a designated facility and quarantine at home.

Ensuring an appropriate setting and adequate provisions

The implementation of quarantine implies the use or creation of appropriate facilities in which a person or persons are physically separated from the community while being cared for.

Possible settings for quarantine include hotels, dormitories, other facilities catering to groups, or the contact's home. Regardless of the setting, an assessment must ensure that the appropriate conditions for safe and effective quarantine are being met. Facilities for those in quarantine should be disability inclusive, and address the specific needs of women and children.

If quarantine is undertaken at home, chosen, the quarantined person should occupy a well-ventilated single room, or if a single room is not available, maintain a distance of at least 1 metre from other household members. The use of shared spaces, crockery and cutlery should be minimized, and shared spaces (such as the kitchen and bathroom) should be well ventilated.

Quarantine arrangements in designated facilities should include the following measures:

Those who are in quarantine should be placed in adequately ventilated rooms with large quantities of fresh and clean outdoor air to control contaminants and odours. There are three basic criteria for ventilation:

1. ventilation rate: the amount and quality of outdoor air provided into the space;
2. airflow direction: the direction of airflow should be from clean to less-clean zones; and
3. air distribution or airflow pattern: the supply of air to each part of the space to improve dilution and removal of pollutants from the space.

For quarantine facilities, ventilation of 60 liters/second per person (L/s/person) is adequate for naturally ventilated areas or 6 air changes per hour for mechanically ventilated areas (See Box 1. How to estimate airflow rate and air change per hour).

Airflow direction can be assessed by measuring the pressure difference between the rooms with a differential pressure gauge. If measuring the pressure difference is not feasible, the airflow direction from a clean to a less clean area can be assessed using cold smoke (clearance of smoke should occur within a few seconds of release). Incense sticks can also be used if cold smoke test puffers are not available. Those performing this measurement should be mindful of fire hazards.

For quarantine at home, consider using natural ventilation, opening windows if feasible and safe to do so. For mechanical systems, increase the percentage of outdoor air, using economizer modes of heating, ventilation and air-conditioning (HVAC) systems operations and potentially as high as 100%. Before increasing outdoor air percentage, verify compatibility with HVAC system capabilities for both temperature and humidity control as well as compatibility with outdoor/indoor air quality considerations.

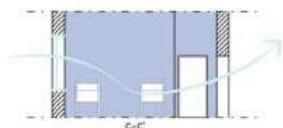
If HVAC systems are used, they should be regularly inspected, maintained and cleaned. Rigorous standards for installation and maintenance of ventilation systems are essential to ensure that they are effective and contribute to a safe environment within the health facility as a whole. Recirculation of air (e.g. split AC units, fan coils, or any system that runs with a recirculation mode) should be avoided where possible. The

Box 1- How to estimate airflow and air change per hour (ACH)

Natural ventilation

As a rule of thumb, wind-driven natural ventilation rate can be calculated as follows:

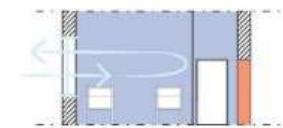
Cross ventilation



i.e. Open window + open door

$$\text{Ventilation rate (l/s)} = 0.65 \times \text{wind speed (m/s)} \times \text{smallest opening area (m}^2\text{)} \times 1000$$

Single-side ventilation



i.e. Open window + closed door

$$\text{Ventilation rate (l/s)} = 0.05 \times \text{wind speed (m/s)} \times \text{smallest opening area (m}^2\text{)} \times 1000$$

Mechanical ventilation

Knowing the airflow (ventilation rate) provided by the ventilation system and the volume of the room:

$$\text{ACH} = [\text{ventilation rate (l/s)} \times 3600 (\text{s/hr})] \times 0.001 (\text{m}^3/\text{s})] / [\text{room volume (m}^3\text{)}]$$

use of fans for air circulation should be avoided if possible unless it is in a single occupancy room when there are no other individuals present. If the use of fans is unavoidable, increase outdoor air exchange by opening windows and minimizing air blowing from one person directly at another in order to avoid spread of droplets or aerosols.

- Strategies for ensuring adequate ventilation in public buildings are described in the WHO Q&A on ventilation and air conditioning in the context of COVID-19.¹¹ The rooms should ideally be a single room with ensuite hand hygiene and toilet facilities. If single rooms are not available, beds should be placed at least 1 metre apart (see section on children).
- Physical distance of at least 1 metre must be maintained between all persons who are quarantined.
- Suitable environmental infection controls must be used, including ensuring access to basic hygiene facilities (i.e. running water and toilets) and waste-management protocols.
- Accommodation should include:
 - provision of adequate food, water, and hygiene facilities;
 - secure storage places for baggage and other possessions;
 - medical treatment for existing conditions as necessary;
 - communication in a language that the quarantined individuals can understand, with an explanation of their rights, services that are available, how long they will need to stay and what will happen if they become sick; if necessary, contact information for their local embassy or consular support should be provided.
- Health care must be provided for those requiring medical assistance.
- Those who are in quarantine, including children, must have some form of communication with family members who are outside the quarantine facility, for example, telephone.

- If possible, access to the internet, news, and entertainment should be provided.
- Psychosocial support should be available.
- Older persons and those with comorbid conditions require special attention because of their increased risk for severe COVID-19, including access to medical provisions and equipment (e.g. medical masks).

Protection and provision of care for children

When implementing quarantine, authorities should avoid family separation, weighing the welfare of the child against the potential risk of COVID-19 transmission within the family. Any decision to separate a child from his or her caregiver when implementing quarantine should include careful and thorough consideration of the possible consequences of family separation.

If a child is a contact:

- Children should ideally be quarantined at home, in the care of a parent or other caregiver.
- When this is not possible, children should be quarantined in a household in the care of an adult family member or other caregiver who is at low risk of severe COVID-19. Known risk factors for severe disease include individuals aged >60 years and individuals with underlying medical conditions.⁸
- If quarantine at home is not possible, children should be quarantined and cared for in a child-friendly space, taking into consideration the specific needs of children, their safety as well as physical and mental well-being. All efforts should be made to allow a caregiver or other adult family member to visit daily and/or stay with the child throughout the quarantine period.
- Policies and individual decisions should allow home-based quarantine of children and caregivers based on a holistic assessment in which the child's best interests are the primary consideration.

- Any setting that anticipates hosting children, particularly children without caregivers, must provide sufficiently trained care staff who can provide the children with a safe, caring and stimulating environment. Each quarantine facility receiving children should assign one staff member as a focal point for child protection issues. Staff who monitor the health of quarantined children should be trained to recognize the symptoms of COVID-19 in children, as well as signs that they need immediate medical assistance. Referral pathways should be established in advance.

If an adult is a contact, and a child is not, the adult may need to be quarantined apart from the child. In this case, the child should be placed in the care of another non-contact adult family member or caregiver.

Infection prevention and control measures

The following IPC measures¹⁰ should be used to ensure a safe environment for quarantined persons. These measures apply to quarantine in a designated facility and to quarantine at home.

a. Early recognition and control

- Any person in quarantine who develops febrile illness or respiratory symptoms at any point during the quarantine period should be treated and managed as a suspected COVID-19 case and immediately isolated. Ensure the quarantine facility has a designated referral centre and clear process for any symptomatic person. A designated room (or, if not feasible, designated area) is recommended for isolating any persons who develop symptoms, if the facility uses shared rooms, while waiting to transfer the individual to the referral centre.
- Standard precautions apply to all persons who are quarantined and to quarantine personnel.
 - Perform hand hygiene frequently, particularly after contact with respiratory secretions, before eating, and after using the toilet. Hand hygiene includes either cleaning hands with soap and water or with an alcohol-based hand rub. Alcohol-based hand rubs are preferred if hands are not visibly dirty; hands should be washed with soap and water when they are visibly dirty.
 - Ensure that all persons in quarantine are practising respiratory hygiene and are aware of the importance of covering their nose and mouth with a bent elbow or paper tissue when coughing or sneezing, and then immediately disposing of the tissue in a wastebasket with a lid and then performing hand hygiene.
 - Refrain from touching the eyes, nose and mouth.
 - Physical distance of at least 1 metre should be maintained between all persons who are quarantined.
 - To prevent COVID-19 transmission effectively in areas of community transmission, governments should encourage the general public to wear masks in specific situations and settings, such as on public transport, in shops or in other confined or crowded environments, as part of a comprehensive approach to suppress SARS-CoV-2 transmission.¹²

b. Administrative controls

Administrative controls and policies for IPC within quarantine facilities include but may not be limited to:

- Educating persons who are quarantined and quarantine personnel about IPC measures. All personnel working in the quarantine facility need to have training on standard precautions (hand hygiene, respiratory etiquette, PPE, cleaning and disinfection, waste and linen management) before the quarantine measures are implemented. The same advice on standard precautions should be given to all quarantined persons on arrival.
- Both personnel and quarantined persons should understand the importance of promptly seeking medical care if they develop symptoms; developing policies to ensure the early recognition and referral of a suspected COVID-19 case.

c. Environmental controls

Environmental cleaning and disinfection procedures¹³ must be followed consistently and correctly. Those responsible for cleaning need to be educated about and protected from COVID-19 and ensure that environmental surfaces are regularly and thoroughly cleaned throughout the quarantine period, as well as ensuring safe and appropriate storage, handling and use of all cleaning materials and disinfectants. The following actions are important:

- Establish sustainable IPC infrastructure (for example, by designing appropriate facilities).
- Ensure all persons quarantined in facilities have single rooms with ensuite facilities. Where single rooms are not available, maintain a minimum of 1 metre separation between beds and apply cohorting strategies.
- Clean and disinfect frequently touched surfaces – such as bedside tables, bed frames and other bedroom furniture – at least once daily. Clean and disinfect bathroom and toilet surfaces at least once daily. Regular household soap or detergent should be used first for cleaning, and then after rinsing, regular household disinfectant, containing 0.1% sodium hypochlorite (bleach, equivalent to 1000ppm) should be applied by wiping surfaces.¹³ For surfaces that cannot be cleaned with bleach, 70% ethanol can be used.
- Wash clothes, bed linen, and bath and hand towels using regular laundry soap and water, or machine wash at 60–90 °C (140–194 °F) with common laundry detergent, and dry thoroughly.
- In a designated quarantine facility, cleaning personnel should wear adequate personal protective equipment (PPE)¹⁴ and be trained to use it safely. In non-health care settings where disinfectants such as bleach are being prepared and used, the minimum recommended PPE is rubber gloves, impermeable aprons and closed shoes.¹³ Eye protection and medical masks may be needed to protect personnel against chemicals used or if there is a risk of exposure to blood /body fluids, such as when handling soiled linen or cleaning toilets. Cleaning personnel should perform hand hygiene before putting on and after removing PPE.
- Waste generated during quarantine should be placed in strong bags and sealed before disposal.¹⁵

- Countries should consider implementing measures to ensure that this type of waste is disposed of in a sanitary landfill and not in an unmonitored open area.

Requirements for monitoring the health of quarantined persons

Daily follow up of persons who are quarantined should be conducted within the facility or home for the duration of the quarantine period and should include screening for body temperature and symptoms in accordance with WHO and/or national surveillance protocols and case definitions. Groups of persons at higher risk of severe disease (individuals aged >60 years and individuals with underlying medical conditions) may require additional surveillance or specific medical treatments.

Consideration should be given to the resources needed, including personnel and, for example, rest periods for staff at quarantine facilities. Appropriate resource allocation is particularly important in the context of an ongoing outbreak, when limited public health resources may need to be prioritized for health-care facilities and case-detection activities.

Laboratory testing during quarantine

Any person in quarantine who develops symptoms consistent with COVID-19 at any point during the quarantine period should be treated and managed as a suspected case of COVID-19 and tested.

For contacts who do not develop symptoms, WHO no longer considers laboratory testing a requirement for leaving quarantine after 14 days.

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WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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Home care for patients with suspected or confirmed COVID-19 and management of their contacts

Interim guidance
12 August 2020

Allegato 4



Background

This document is an update of the guidance published on 17 March 2020 entitled "Home care for patients with COVID-19 presenting with mild symptoms and management of their contacts". This interim guidance has been updated with advice on safe and appropriate home care for patients with coronavirus disease 2019 (COVID-19) and on the public health measures related to the management of their contacts. The main differences from the previous version include:

- Considerations for clinicians when identifying and supporting patients who could receive care at home;
- Considerations regarding the IPC requirements for the household to be suitable for caring for COVID-19 patients in the home;
- Clinical monitoring and treatment of COVID-19 patients at home;
- Waste management in the home setting in the context of COVID-19 and;
- An appendix on the effective implementation of home-care policies and guidelines for patients with COVID-19

Purpose of the guidance

This rapid advice is intended to guide public health and infection prevention and control (IPC) professionals, health facility managers, health workers^a and other trained community-based providers when addressing issues related to home care for patients with suspected or confirmed COVID-19, and thus refers to a patient with suspected or confirmed COVID-19 throughout the document.

In many contexts, health services are delivered at community level and in the home by community health workers, traditional medicine practitioners, social care workers, or a variety of formal and informal community-based providers, including caregivers. For the purpose of this document, "caregivers" refers to parents, spouses and other family members or friends providing informal care as opposed to the care provided by formal health-care providers (1).

It is therefore critical to ensure that caregivers have appropriate training and guidance on how to care for patients as well as how to minimize the risk of infection, including

training on important hygiene procedures and on recognizing signs that the COVID-19 patient's condition is worsening and that he or she needs to be sent to a health facility.

In addition, health workers and caregivers providing support in the home should be provided with the appropriate personal protective equipment (PPE) for the tasks that they are expected to perform and trained in PPE use and removal.

This guidance is based on the latest available evidence on the clinical management of COVID-19, the feasibility of implementing safe care at home, including IPC measures, the capacity for communication between home-based caregivers and community health providers, as well as home-based patients' access to health facilities. The appendix provides implementation strategies for care in the home setting.

Decision to care for COVID-19 patients at home

Home care may be considered for an adult or child with confirmed or suspected COVID-19 when inpatient care is unavailable or unsafe (e.g. when capacity is insufficient to meet the demand for health-care services). Such patients who have been discharged from hospital may also be cared for at home, if necessary.

Caring for an infected person in the home, rather than in a medical or other specialized facility, increases the risk of transmitting the virus to others in the home. However, the isolation of people who are infected with SARS-CoV-2 that causes COVID-19 can make an important contribution to breaking the chains of transmission of the virus. The decision as to whether to isolate and care for an infected person at home depends on the following three factors: 1) clinical evaluation of the COVID-19 patient, 2) evaluation of the home setting and 3) the ability to monitor the clinical evolution of a person with COVID-19 at home.

1. Clinical evaluation of COVID-19 patient

The decision to isolate and monitor a COVID-19 patient at home should be made on a case-by-case basis. Their clinical evaluation should include:

- clinical presentation
- any requirement for supportive care

^a WHO defines health workers as follows: "Health workers are all people engaged in actions whose primary intent is to enhance health. (2,3)

- risk factors for severe disease (i.e. age (> 60 years), smoking, obesity and noncommunicable diseases such as cardiovascular disease, diabetes mellitus, chronic lung disease, chronic kidney disease, immunosuppression and cancer) (4)

Patients who are asymptomatic or those with mild^b or moderate^c disease without risk factors for poor outcome may not require emergency interventions or hospitalization, and could be suitable for home isolation and care, provided the following two requirements are fulfilled in the home setting:

1. conditions for implementing appropriate IPC as outlined in this document are met;
2. close monitoring for any signs or symptoms of deterioration in their health status by a trained health worker is feasible (4).

These two requirements also apply to pregnant and postpartum women, and to children. Ensure adequate provisions for appropriate PPE for both patients and caregivers (4,5).

2. Evaluation of the home setting

A trained health worker should assess whether the home in question is suitable for the isolation and the provision of care^d of a COVID-19 patient, including whether the patient, caregiver and/or other household members have all they need to adhere to the recommendations for home care isolation. For example, they need hand and respiratory hygiene supplies, environmental cleaning materials, the ability to impose and adhere to restrictions on people's movement around or from the house. The ability to address safety concerns such as accidental ingestion of and fire hazards associated with alcohol-based hand rubs and cleaning products should also be

considered in the assessment (see Box 1: Factors to consider when assessing a household).

Limited or no access to water and sanitation, as well as to resources for cleaning and disinfection and hygiene pose risks for caregivers and community members for transmission of COVID-19. Health ministries and intersectoral partners at national and subnational levels should engage with communities and other actors to identify and provide the resources needed, implement risk communication strategies to provide support, and look to other contexts for possible solutions to ensure that IPC measures, as described in the next section of this document, can be met to provide safe, clean care in the home (6).

Children should remain with their caregivers wherever possible and this should be decided in consultation with the caregiver and the child. To prepare families with children for potential illness within a family, community protection focal points and caseworkers should help families plan and agree in advance on how they will care for children in case the primary caregivers become ill. Children living with primary caregivers who are elderly, disabled or have underlying health conditions should be prioritized (7-9).

If these or other vulnerable persons are present in the home setting and cannot be kept apart from the patient, then the health worker should offer to arrange for an alternative location for isolation for the patient if available (10).

If adequate isolation and IPC measures cannot be ensured at home, then isolation may need to be arranged, with consent from the patient, and agreement from the caregiver, and members of the household in designated and equipped community facilities, (such as repurposed hotels, stadiums or gyms) or in a health facility (1,5,10-12).

Box 1-Factors to consider when assessing households

- Is the person with COVID-19 living alone? If so, what support network do they have? If not, who is living in the household with them?
- How is the person with COVID-19 and their family living? How feasible and practical would it be to implement recommendations? What alternative options are available?
- What are the needs related to disability, caring responsibilities for adults, older adults or children? What are the needs of other household members?
- How feasible is it for one caregiver to be identified to support the person with COVID-19 at home?
- What do household members know about COVID-19 and preventing transmission in the home? What are their information needs about COVID-19 and transmission prevention? Does the household know where to seek additional support or information related to care for the person with COVID-19 if needed?
- What does the person with COVID-19 and/or their household members think they need to be able to cope at home?
- Does the family understand when to call for medical assistance? Do they have the means to call for medical assistance?
- What are the psychosocial needs of the person with COVID-19 and household members? What support is available to them related to coping with the emotional impact or fear of stigma?
- What is the economic impact on the household? Who is the primary provider financially? What is the impact if that person needs to be isolated and/or to carry additional household or care responsibilities?
- Which health facility and, if possible, named professional is responsible for following up the care of the person with COVID-19? How will follow up of this care be maintained?

^b Symptomatic patient meeting the case definition for COVID-19 without evidence of viral pneumonia or hypoxia.

^c Moderate illness may include (i) in an adult or adolescent: clinical signs of pneumonia (fever, cough, dyspnoea, fast breathing) but no signs of severe pneumonia, including SpO₂≥90% on room air, (ii) in a child: clinical signs of non-severe pneumonia (cough or

difficulty breathing + fast breathing and/or chest indrawing) and no signs of severe pneumonia

^d A sample checklist for assessing environmental conditions in the home is available in the Annex C of Infection prevention and control of epidemics and pandemic prone acute respiratory diseases (13)

3. Ability to monitor the clinical evolution of a patient with COVID-19 at home

Ensure that the patient can be adequately monitored at the home. Home-based care should be provided by health workers if possible. Lines of communication between the caregiver and trained health workers or public health personnel, or both, should be established for the duration of the home-care period, that is, until the patient's symptoms have completely resolved. Monitoring patients and caregivers in the home can be done by trained community workers or outreach teams by telephone or email (1,6).

Advice for health workers providing care in a private home

1. IPC measures for health workers

Health workers should take the following measures when providing care in the home:

- Carry out a risk assessment to determine the appropriate PPE they need when caring for the patient and follow the recommendations for droplet and contact precautions (5,14).
- Patient must be placed in adequately ventilated rooms with large quantities of fresh and clean outdoor air to control contaminants and odours (15).
- Consider using natural ventilation, by opening windows if possible and safe to do so.
- For mechanical systems, increase the percentage of outdoor air, using economizer modes of HVAC operations and potentially as high as 100% (16).
- If heating, ventilation and air-conditioning (HVAC) systems are used, they should be regularly inspected, maintained, and cleaned. Rigorous standards for installation and maintenance of ventilation systems are essential to ensure that they are effective and contribute to a safe environment (16).
- Use of fans for air circulation should be avoided if possible unless it is in a single occupancy room when there are no other individuals present. If the use of fans is unavoidable, increase outdoor air exchange by opening windows and minimize air blowing from one person directly to another (15,16).
- Limit the number of household members present during any visits and request that they maintain a distance of at least 1 metre (m) from the health worker.
- When providing care or working within 1m of the patient request that the patient wear a medical mask.^c Individuals who cannot tolerate a medical mask should practise rigorous respiratory hygiene; that is, coughing or sneezing into a bent elbow or tissue and then immediately disposing of the tissue followed by hand hygiene (5,17).
- Perform hand hygiene after any type of contact with the patient or his/her immediate environment and according to the WHO 5 moments (18). Health workers should have with them a supply of alcohol-based hand rub for their use.

- When washing hands with soap and water, use disposable paper towels to dry hands. If paper towels are not available, use clean cloth towels and replace them frequently (18,19).
- Provide instructions to caregivers and household members on how to clean and disinfect the home, as well as on the safe and correct use and storage of cleaning materials and disinfectants (19).
- Clean and disinfect any reusable equipment used in the care of the patient before using on another patient according to standard precautions and established protocols (20).
- Remove PPE and perform hand hygiene before leaving the home and discard disposable PPE. Clean and disinfect reusable items (i.e. eye protection) or store reusable items for decontamination later according to established protocols (20).
- Do not reuse single use PPE (21).
- Dispose of waste generated from providing care to the patient as infectious waste in strong bags or safety boxes as appropriate, close completely and remove from the home (14).
- For more guidance on waste management in community settings, please refer to the [Water, sanitation, hygiene and waste management for the COVID-19 virus](#).

2. Clinical considerations for home-based care of patients with mild or moderate COVID-19

Symptomatic treatment

WHO recommends that patients with COVID-19 receive treatment for their symptoms, such as antipyretics for fever and pain (according to manufacturers' instructions) as well as adequate nutrition and appropriate rehydration (4).

WHO advises against antibiotic prophylaxis or treatment for patients with mild COVID-19. For patients with moderate COVID-19, antibiotics should not be prescribed unless there is clinical suspicion of a bacterial infection (4).

For details on prescribing antimicrobials, please refer to the guideline from WHO: [Clinical management of COVID-19](#).

In areas with other endemic infections that cause fever (such as influenza, malaria, dengue, etc.), febrile patients should seek medical care, be tested and treated for those endemic infections in accordance with routine protocols, irrespective of the presence of respiratory signs and symptoms.

Drug supply management for patients with chronic diseases

COVID-19 patients with non-communicable diseases or other chronic conditions receiving home-based care should have an adequate supply of medication (i.e. 6-month drug supply in lieu of the usual 60-90 day supply). Older people should have at least a 2-week supply of critical medicines and supplies. Repeat prescriptions and mechanisms for delivering refills should be readily available (6).

^c Medical masks are surgical or procedure masks that are flat or pleated (some are shaped like a cup); they are held in place by strings that tie around the back of the head

Monitor for worsening symptoms regularly

Advise the COVID-19 patients and their caregivers about the signs and symptoms of complications or how to recognise a deterioration in their health status that require medical attention. Monitor these regularly, ideally once a day. For example, if a patient's symptoms become much worse (such as light headedness, difficulty breathing, chest pain, dehydration, etc.) from the initial clinical assessment, he or she should be directed to seek urgent care (4).

Caregivers of children with COVID-19 should also monitor their patients for any signs and symptoms of clinical deterioration requiring an urgent re-evaluation. These include difficulty breathing/fast or shallow breathing, blue lips or face, chest pain or pressure, new confusion as well as an inability to wake up, interact when awake, drink or keep liquids down.

For infants these include: grunting and an inability to breastfeed (4).

Home pulse oximetry is a safe, non-invasive way to assess oxygen saturation in the blood and can support the early identification of low oxygen levels in patients with initially mild or moderate COVID-19 or silent hypoxia, when a patient does not appear to be short of breath but his or her oxygen levels are lower than expected. Home pulse oximetry can identify individuals in need of medical evaluation, oxygen therapy or hospitalization, even before they show clinical danger signs or worsening symptoms (22,23).

Palliative care at home

Palliative care includes but is not limited to end-of-life care. Palliative care is a multifaceted, integrated approach to improving the quality of life of adults and paediatric patients and their families facing the problems associated with life-threatening illness. All health workers caring for COVID-19 patients should be able to offer basic palliative care, including relief of shortness of breath (dyspnoea) or other symptoms, and social support, when such care is required (4). Efforts should be made to ensure that palliative interventions are accessible for patients, including access to medicines, equipment, human resources and social support at home. Palliative care interventions are described in detail in the WHO guidance entitled [Integrating palliative care and symptom relief into the response to humanitarian emergencies and crises](#).

3. Releasing COVID-19 patients from isolation at home

COVID-19 patients who have been discharged from hospital may continue to be cared for at home. This may include individuals who have clinically recovered from severe or critical illness and who may no longer be infectious.

Patients who are cared for at home should be isolated until they are no longer infectious (5,8):

- For asymptomatic persons: 10 days after testing positive.

- COVID-19 patients who receive home-based care or have been discharged from hospital should remain in isolation for a minimum of 10 days after symptom onset, plus at least 3 additional days without symptoms (including without fever and without respiratory symptoms) (4,24).
- Health workers need to establish a means of communicating with the caregivers of individuals with COVID-19 for the duration of the isolation period.

4. Management of contacts

A contact is a person who has experienced any one of the following exposures during the two days before and the 14 days after the onset of symptoms of a probable or confirmed case: 1. face-to-face contact with a probable or confirmed case within 1 metre and for at least 15 minutes; 2. direct physical contact with a probable or confirmed case; 3. direct care for a patient with probable or confirmed COVID-19 disease without using recommended personal protective equipment; 4. other situations as indicated by local risk assessments.

Contacts should remain in quarantine at home and monitor their health for 14 days from the last day of possible contact with the infected person (12). Guidance on follow up and management of contacts can be found in the [Public health surveillance for COVID-19](#).

IPC advice for caregivers providing care at home

Caregivers, household members and individuals with probable or confirmed COVID-19 should receive support from trained health workers. Caregivers and household members should receive guidance from a trained health worker on how to adhere to the IPC recommendations for health workers as well as the following additional recommendations:

- Limit the patient's movement around the house and minimize shared space. Ensure that shared spaces (e.g. kitchen, bathroom) are well ventilated.(5,15).
- Household members should avoid entering the room where the patient is located or, if that is not possible, maintain a distance of at least 1m from the patient (e.g. sleep in a separate bed)^f (5).
- Limit the number of caregivers. Ideally, assign one person who is in good health and has no underlying chronic conditions (4,5).
- Visitors should not be allowed in the home until the person has completely recovered, shows no signs or symptoms of COVID-19 and has been released from isolation.
- Perform hand hygiene according to the WHO 5 moments (18). Hand hygiene should also be performed before and after preparing food, before eating, after using the toilet, and whenever hands look dirty. If hands are not visibly soiled, an alcohol-based hand rub can be used. For visibly soiled hands, always use soap and water.

^f An exception may be made for breastfeeding mothers. Considering the benefits of breastfeeding and the insignificant role of breast milk in the transmission of other respiratory viruses, a mother can continue breastfeeding. The mother should wear a medical mask when she is near her baby and perform hand hygiene before and after having close contact with the baby. She will also need to follow the other hygiene measures described in this document.

- A medical mask⁴ should be provided to the patient, worn as much as possible by the patient and changed daily and whenever wet or dirty from secretions. Individuals who should practice rigorous respiratory hygiene; that is, coughing or sneezing into a bent elbow or tissue and then immediately disposing of the tissue followed by hand hygiene (5,17).
- Materials used to cover the mouth and nose should be discarded or cleaned appropriately after use (e.g. wash handkerchiefs, using regular soap or detergent and water).
- Caregivers should wear a medical mask that covers their mouth and nose when they are in the same room as the patient. Masks should not be touched or handled during use. If the mask gets wet or dirty from secretions, it must be replaced immediately with a new clean, dry mask. Remove the mask using the appropriate technique, which is to untie it, rather than touching the front of the mask, to discard it immediately after use and then to perform hand hygiene (17,21).
- Avoid direct contact with the patient's body fluids, particularly oral or respiratory secretions, and stool. Use disposable gloves and a mask when providing oral or respiratory care, and when handling stool, urine and other waste. Perform hand hygiene before putting on the mask and gloves and after removing gloves and the mask (5).
- Do not reuse medical masks or gloves (unless the gloves are a reusable product such as a utility glove) (19,21).
- Gloves and protective clothing (e.g. plastic aprons) should be used when cleaning surfaces or handling clothing or linen soiled with body fluids. Depending on the context, wear either utility or single-use gloves (19).
- Clean and disinfect surfaces that are frequently touched in the room where the patient is being cared for, such as bedside tables, bedframes, and other bedroom furniture at least once daily. Clean and disinfect bathroom and toilet surfaces at least once daily. Regular household soap or detergent should be used first for cleaning, and then, after rinsing, regular household disinfectant containing 0.1% sodium hypochlorite (i.e. equivalent to 1000 ppm) should be applied by wiping surfaces (19).
- Use dedicated linen and eating utensils for the patient; these items should be cleaned with soap and water after use and may be re-used instead of being discarded (8).
- Place contaminated linen in a laundry bag. Do not shake soiled laundry and avoid contaminated materials coming into contact with skin and clothes (19).
- Clean the patient's clothes, bed linen, and bath and hand towels using regular laundry soap and water, or machine wash at 60–90 °C (140–194 °F) with common household detergent, and dry thoroughly (19).
- After use, utility gloves should be cleaned with soap and water and decontaminated with 0.1% sodium hypochlorite solution. Single-use gloves (e.g. nitrile or latex) should be discarded after each use. Perform hand hygiene before putting on and after removing gloves (19).
- Waste generated at home while caring for a COVID-19 patient during the recovery period should be packed in strong bags and closed completely before disposal and eventual collection by municipal waste

services. If such a service does not exist, waste may be buried. Burning is the least preferred option, as it is bad for human health and the environment (5,19).

- Avoid other types of exposure to contaminated items from the patient's immediate environment (e.g. do not share toothbrushes, cigarettes, cutlery, crockery, towels, washcloths or bed linen) (5).

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Appendix: Implementation of home care policies and guidelines

Policies and guidelines related to home care for patients with confirmed or suspected COVID-19 will of course be interpreted and implemented at national and local levels in countries. The contexts and needs of households will vary; therefore, tailored approaches to information and support packages for home care are recommended.

Health and social systems

Implementation of guidelines and policies for home-based care of people with COVID-19 should, as far as possible, build on community and hospital health services and other sectors of society, including the social and private sectors. In this way, policy implementation can draw on assets that already exist. Innovative examples of service adaptations from other parts of the world can and should be widely shared (See box 2).

Information and communication

The provision of clear, consistent information about COVID-19, including how it spreads and how to prevent transmission in the home, is a key part of implementing this guidance. Such information should be tailored to different groups, available in local languages, expressed in simple, clear text and attractive images that speak to local populations. These images should include older and younger people, people from different ethnic groups, and people with disabilities. Real-life images may be preferred. Such information should also include details of where people can get further reliable information about COVID-19 and home care, as well as where caregivers and household members can access support for themselves. This public information should include advice on how to follow the WHO recommendations and is often best provided through two-way interaction.

Understand support needs of households

Information alone is not enough to ensure good infection control practices and adherence to recommended measures and behaviour in the home to prevent transmission. Several factors affect people's ability to follow recommended guidance, including their perception of the risk of becoming infected, their beliefs about COVID-19 and COVID-19 care, their attitudes and beliefs about the effectiveness of recommendations, and the extent to which recommendations are practical and feasible in their living environment (25). These factors may also change over time. Furthermore, becoming ill or living with a household member who is ill may trigger a strong emotional response. Household members report feeling anger, fear and resentment, which affects the way they relate to each other and their mental health. Households may need practical support, such as help with obtaining food, water and medicines. Understanding these factors will help authorities develop tailored support

packages for affected households. For example, authorities can consider home delivery of medical supplies, food, etc. to reduce household movement.

Needs of care providers

The primary caregiver of a COVID-19 patient may have their own specific needs that require support. These caregivers may also be responsible for caring for other household members, such as older adults, adults or children with disabilities, or with young children (26). Furthermore, they may have their own responsibilities, such as work or school, and their own vulnerabilities, such as chronic conditions (10). Women disproportionately bear the burden of unpaid care work, including for providing care to those sick at home and to their extended family members. This includes elderly women providing care for very young children or for older adults. Particular attention should be paid to households headed by a single woman who has had to give up remunerated work to care for sick relatives. Implementing home-care policies and guidance should account for the needs of these caregivers. For example, the initial household assessment should address the support needs of the primary caregiver (1,2,6).

Needs of health workers

Community health workers will be the primary point of contact between households and health-care facilities (6). To provide effective support to households, these health workers should be provided with training and practical tools to assist them (1). For example, these tools could include user friendly information packages, assessment tools, check lists, and context specific hygiene kits. Community health workers can also support households by ensuring they continue to receive social assistance on time. In addition, equipping community health workers with simple approaches to providing psychosocial support also helps to meet patient needs. At the same time, the mental health needs of community health workers should also be supported, especially when they face stigma, burnout and distress.

Environmental factors and constraints

When formulating national and local guidance in countries, recommendations on infection control and transmission prevention in the home should be feasible in the home environment. For example, in many parts of the world, where clean running water is not easily accessible, alternative approaches to hand hygiene, such as home built tippy taps, are needed (27).

Isolation of the person with COVID-19 may not be physically possible in multiple-occupancy households. Moreover, in intergenerational households, vulnerable members may need to be shielded or alternative arrangements sought for the person who is ill or for these vulnerable household members.

Box -2 Examples of home-care approaches in countries

France	A group of university hospitals in Paris, France organizes teams comprising a health professional and social worker to visit COVID-19 patients and their caregivers. The aim is to: <ul style="list-style-type: none">• provide screening and testing of family and close social contacts• provide guidance on isolation at home• provide a protection kit, such as masks and alcohol-based hand rub• provide ongoing monitoring
Haiti	Teams including clinical health workers and water, sanitation and hygiene (WASH) public health specialists are sent to homes by the health department and in agreement with the household. They seek to: <ul style="list-style-type: none">• conduct a basic clinical assessment of the COVID-19 patient, assesses the home and WASH conditions to determine if home isolation is feasible• inform the family or household members about COVID-19, explain how to follow isolation procedures and provide training on hygiene measures• provide the family with a hygiene and cleaning kit, as well as household cleaning and disinfection
Mauritania	Confirmed COVID-19 patients receive a home visit to: <ul style="list-style-type: none">• provide education about infection prevention measures at home, including use of masks and household cleaning and disinfection• provide hygiene kits (to households who cannot afford such items) consisting of local hand washing system, bleach and reusable mask• follow-up care is provided by community surveillance teams

WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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Allegato 5

NOTA TECNICA

per rimodulare i criteri per la re immissione in comunità di persone positive SARS-CoV-2 e contatti stretti

L'isolamento dei casi di COVID-19 si riferisce alla separazione delle persone infette dagli altri, per il periodo di contagiosità, in ambiente e condizioni tali da prevenire la trasmissione dell'infezione.

La quarantena, invece, si riferisce alla restrizione dei movimenti, per la durata del periodo di incubazione, di persone *sane* ma che potrebbero essere state esposte ad un agente infettivo o ad una malattia contagiosa, con l'obiettivo di monitorare l'eventuale comparsa di sintomi e identificare tempestivamente nuovi casi.

Il presente documento indica le evidenze disponibili a supporto dell'adozione di una strategia basata sui sintomi, piuttosto che basata sui test molecolari, per interrompere l'isolamento dei casi di COVID-19.

Isolamento dei casi di COVID-19.

Il paziente guarito è colui il quale risolve i sintomi dell'infezione da Covid-19 e che risulta negativo in due test consecutivi, effettuati a distanza di 24 ore uno dall'altro, per la ricerca di SARS-CoV-2.

Per il soggetto **asintomatico**, si ritiene opportuno suggerire di ripetere il test per documentare la negativizzazione non prima di 14 giorni (durata raccomandata del periodo d'isolamento/quarantena) dal riscontro della positività.

(Ministero della Salute. Circolare 18584 del 29/05/2020-DGPRA-DGPRA-P 1-2 e Circolare 0006607-29/02/2020). Se entrambi i tamponi risultano negativi la persona può definirsi guarita, altrimenti deve continuare l'isolamento.

Il test di laboratorio considerato attualmente il "gold standard" per la diagnosi d'infezione SARS-CoV-2 si basa sulla metodica molecolare della Real Time PCR che è in grado di rilevare l'RNA virale con una alta specificità e sensibilità fino a qualche decina di copie genomiche virali in campioni respiratori. Questa metodica ha la limitazione di non poter identificare se l'RNA presente nei campioni clinici possa riferirsi a particelle virali vitali o a tracce di genoma virale non infettivo. Pertanto, il rilevamento dell'RNA virale non significa necessariamente che una persona sia contagiosa e in grado di trasmettere il virus a un'altra persona. Un test che presenta bassa carica virale o tracce di RNA del virus viene considerato "debolmente positivo" perché generato dopo molti cicli di amplificazione genica. Alcuni soggetti a distanza di tempo dalla guarigione clinica, possono risultare "debolmente positivi" a seguito di un successivo test diagnostico su tampone effettuato per altre necessità creando dubbi sul criterio di guarigione e sulla possibilità di trasmettere la malattia ad altri soggetti.

Recentemente l'Organizzazione Mondiale della Sanità (OMS) ed altri organismi internazionali hanno suggerito che per interrompere l'isolamento di pazienti COVID-19 si considerino solo criteri clinici e temporali invece che criteri di laboratorio (Tabella 1).

In particolare, l'OMS, sulla base delle evidenze che mostrano come il virus possa essere raramente coltivato in campioni respiratori raccolti a distanza di 9 giorni dall'insorgenza dei sintomi (periodo in cui solitamente si verificano anche livelli crescenti di anticorpi neutralizzanti e risoluzione dei sintomi), specialmente nei pazienti con malattia lieve, indica la possibilità di interrompere l'isolamento dei pazienti basandosi solo su criteri clinici (con un tempo minimo di 13 giorni dall'inizio dei sintomi), piuttosto che basarsi rigorosamente su risultati di laboratorio. I motivi dati dall'OMS per questo cambiamento sono i seguenti:

- le difficoltà di applicare la raccomandazione iniziale per l'interruzione dell'isolamento (esecuzione di due test RT-PCR negativi ad almeno 24 ore di distanza), a causa delle limitate risorse di laboratorio, attrezzature e personale in aree con trasmissione intensa.
- le diverse sfide poste dai criteri iniziali, con una trasmissione diffusa nella comunità:
 - Lunghi periodi di isolamento per individui con rilevamento prolungato dell'RNA virale dopo la risoluzione dei sintomi, che influiscono sul benessere individuale, sulla società e sull'accesso all'assistenza sanitaria.
 - Capacità di effettuare diagnosi di laboratorio per soddisfare i criteri di dimissione iniziale in molte parti del mondo.
 - Presenza di RNA virale prolungata al limite di rilevamento mediante i test molecolari a volte con risultati negativi seguiti da risultati positivi, che mette inutilmente in discussione la fiducia nel sistema di laboratorio.
- I nuovi dati che si sono resi disponibili sul rischio di trasmissione virale nel corso della malattia COVID-19.

I nuovi criteri OMS per l'interruzione dell'isolamento tengono conto del rapporto rischi/benefici; tuttavia, nessun criterio è privo di rischi. L'OMS sottolinea che sebbene il rischio di trasmissione dopo la risoluzione dei sintomi sia probabilmente minimo sulla base di ciò che è attualmente noto, non può essere completamente escluso. Esiste un rischio residuo minimo che, utilizzando criteri basati solo sui sintomi (che non prevedono l'esecuzione di tamponi), si possa talvolta verificare una trasmissione del virus. Tuttavia, non esiste un approccio a rischio zero e fare affidamento rigoroso sulla conferma PCR della clearance dell'RNA virale crea altri rischi (ad esempio, quello di esaurire le risorse e limitare l'accesso all'assistenza sanitaria per i nuovi pazienti con malattia acuta), oltre a porre problemi nell'interpretazione dei test al limite del rilevamento dell'RNA virale (i cosiddetti "debolmente positivi").

L'OMS sottolinea inoltre che possono esserci situazioni in cui un rischio residuo minimo è inaccettabile, ad esempio, in individui ad alto rischio di trasmettere il virus a gruppi vulnerabili o in situazioni o ambienti ad alto rischio. In questi casi e nei pazienti che presentano forme gravi di malattia e che sono sintomatici per periodi di tempo prolungati, può ancora essere utile un approccio di laboratorio.

Dati disponibili e punti chiave su infettività dei pazienti con COVID-19 e trasmissione del SARS-CoV-2.

I dati disponibili indicano che le persone con malattia COVID-19 da lieve a moderata rimangono contagiose per non più di 10 giorni dall'insorgenza dei sintomi (l'infettività diminuisce essenzialmente a zero dopo circa 10 giorni dall'insorgenza dei sintomi).

Le persone con malattia da severa a critica e le persone gravemente immunodepresse probabilmente rimangono contagiose per un periodo di tempo più lungo che comunque secondo alcuni studi non supera i 20 giorni dopo l'insorgenza dei sintomi. (Rhee et al).

La positività del tampone invece, può rimanere tale per molte settimane fino a 12 settimane dall'insorgenza della malattia, identificando, di fatto, solo tracce di materiale genetico del virus, non vitale e incapace di trasmettere l'infezione. Il motivo per cui l'RNA SARS-CoV-2 può continuare ad essere rilevabile deve ancora

essere determinata. Di solito 5-10 giorni dopo l'infezione da SARS-CoV-2, l'individuo infetto inizia a produrre gradualmente anticorpi neutralizzanti e si ritiene che il legame di questi anticorpi con il virus riduca il rischio di trasmissione (OMS).

Punti chiave:

1. L'RNA di SARS-CoV-2 è stato rilevato in pazienti 1-3 giorni prima dell'insorgenza dei sintomi e si è osservato che la carica virale raggiunge il picco nel tratto respiratorio superiore entro la prima settimana di infezione, seguita da una diminuzione graduale nel tempo (1-3 settimane). La concentrazione di SARS-CoV-2 RNA, misurata in campioni delle vie respiratorie superiori diminuisce dopo la comparsa dei sintomi. (Midgley et al., 2020; Young et al., 2020; Zou et al., 2020; Walsh et al. 2020; Wölfel et al., 2020; van Kampen et al., 2020).
2. Anche la probabilità di identificare virus competente per la replicazione diminuisce dopo la comparsa dei sintomi. In pazienti con COVID-19 da lieve a moderato, non è stato isolato virus competente per la replicazione dopo 10 giorni dall'insorgenza dei sintomi (Wölfel et al., 2020; Arons et al., 2020; Bullard et al., 2020; Lu et al., 2020, 2020; Korea CDC, 2020). L'isolamento di virus competente per la replicazione tra 10 e 20 giorni dopo l'insorgenza dei sintomi è stato documentato in alcune persone con COVID-19 grave che, in alcuni casi, era complicata dallo stato di immunodepressione (van Kampen et al., 2020). Tuttavia, in questi due gruppi di pazienti, è stato stimato che l'88% e il 95% dei campioni raccolti rispettivamente 10 e 15 giorni dopo l'insorgenza dei sintomi, non ha prodotto virus competenti per la replicazione.

Una recente revisione della letteratura ha mostrato che la infettività diminuisce rapidamente a un livello vicino allo zero circa 10 giorni dopo la comparsa dei sintomi nei pazienti con malattia di entità lieve o moderata e dopo 15 giorni in quelli con malattia grave o immunodepressi. L'intervallo di tempo più lungo associato con il riscontro di virus competente per la replicazione era di 20 giorni (Rhee et al., 2020).

3. Sembra esserci una tendenza al rilevamento dell'RNA virale per un tempo maggiore in pazienti con malattia COVID-19 più grave. Gli studi sulla rilevazione dell'RNA virale in pazienti immunodepressi sono limitati, ma uno studio ha suggerito un rilevamento prolungato dell'RNA virale in pazienti sottoposti a trapianto renale. (OMS)
4. Uno studio prospettico di tracciamento dei contatti condotto a Taiwan ha dimostrato che i contatti familiari e ospedalieri esposti ad un caso i cui sintomi erano iniziati 6 o più giorni prima non hanno sviluppato l'infezione (Cheng et al., 2020). Sono stati identificati 100 casi di COVID-19 e i loro contatti (2.761), ed è stato misurato il tasso secondario di attacco a diversi intervalli dall'inizio dei sintomi. Il tasso di attacco secondario è stato 0,7% tra le 1.818 persone esposte nei primi 5 giorni dall'inizio dei sintomi nel caso e 0% tra 852 persone esposte dopo 5 giorni.
5. Sebbene non sia stato isolato alcun virus competente per la replicazione in campioni delle vie respiratorie superiori di pazienti guariti, raccolti 3 settimane dopo l'insorgenza dei sintomi, si può continuare a rilevare l'RNA di SARS-CoV-2 fino a 12 settimane (Korea CDC, 2020; Li et al., 2020; Xiao et al, 2020). In una indagine su 285 persone "persistentemente positive", di cui 126 avevano sviluppato sintomi ricorrenti, non si sono verificati casi secondari attribuibili ad un contatto con questi casi, tra i 790 contatti identificati. Gli sforzi per isolare virus competente per la replicazione da 108 di questi pazienti non hanno avuto successo (CDC, Korea CDC, 2020).

6. Non sono stati rilevati virus competenti per la replicazione in campioni biologici raccolti da pazienti guariti da COVID-19 che successivamente hanno sviluppato nuovi sintomi e sono risultati nuovamente positivi al SARS-CoV-2 mediante RT-PCR (CDC, Korea CDC, 2020; Lu et al., 2020).

Criteri per interrompere l'isolamento casi COVID-19 adottati da varie istituzioni e Paesi (Tabella 1).

Come indicato in Tabella 1, vari Paesi hanno progressivamente adottato criteri clinici e temporali per interrompere l'isolamento dei casi di COVID-19.

Attualmente, nella maggior parte dei paesi europei la durata dell'isolamento è minore o uguale a 10 giorni (l'OMS indica un periodo minimo di 13 giorni dall'inizio dei sintomi). (Tabella 1).

Paese/Istituzione	Criteri per interrompere l'isolamento <small>DIPARTIMENTO PROTEZIONE CIVILE Allegato n. 1 - Protocollo Uscita COVID/0054049 15/10/2020</small>	Referenze
OMS	<p>Casi sintomatici: calcolare 10 giorni dopo inizio sintomi più altri 3 giorni senza sintomi (inclusa febbre e sintomi respiratori), con un tempo minimo di isolamento di 13 giorni dall'insorgenza dei sintomi.</p> <p>Casi asintomatici: 10 giorni dopo test positivo per SARS-CoV-2</p> <p>Possono esserci situazioni, ad esempio, in individui ad alto rischio di trasmettere il virus a gruppi vulnerabili, pazienti che sono sintomatici per periodi di tempo prolungati, in cui può ancora essere utile un approccio di laboratorio.</p>	Criteria for releasing COVID-19 patients from isolation (Scientific Brief, 17 June 2020)
ECDC	<p>(Indicazioni aggiornate ad aprile 2020)</p> <p>Casi lievi non ospedalizzati: 8 giorni dalla data inizio sintomi E assenza di febbre E miglioramento clinico degli altri sintomi per almeno 3 giorni.</p> <p>Se risorse disponibili: due test negativi (a distanza di 24 ore) almeno 8 giorni dopo la data inizio sintomi.</p> <p>Casi gravi: 14 giorni dalla data inizio sintomi E assenza di febbre E miglioramento clinico degli altri sintomi per almeno 3 giorni.</p> <p>Pazienti immunodepressi: 14 giorni dall'inizio dei sintomi, assenza febbre da almeno 3 giorni e miglioramento clinico degli altri sintomi.</p>	Guidance for discharge and ending isolation in the context of widespread community transmission of COVID-19 – first update 8 April 2020
CDC statunitensi	<p>Pazienti con malattia da lieve a moderata, <i>non immunodepressi</i>:</p> <ul style="list-style-type: none"> - almeno 10 giorni dall'insorgenza dei sintomi - almeno 24 ore dalla risoluzione della febbre (senza uso di farmaci antipiretici) - miglioramento degli altri sintomi (tosse, difficoltà respiratorie). <p>Pazienti con malattia grave/critica</p> <ul style="list-style-type: none"> - almeno 10 giorni e fino a 20 giorni dall'inizio dei sintomi - almeno 24 ore dalla risoluzione della febbre (senza l'uso di farmaci antipiretici) - miglioramento degli altri sintomi (tosse, difficoltà respiratorie) - prendere in considerazione consulto con esperti in controllo delle infezioni. <p>Per le persone gravemente immunodepressive, si può prendere in considerazione una strategia basata sui tamponi, in consultazione con esperti di malattie infettive.</p>	Duration of Isolation and Precautions for Adults with COVID-19
Francia	<p>Pazienti sintomatici: 7 giorni dall'inizio dei sintomi e scomparsa di febbre da almeno 48 ore.</p> <p>(Nota: Questa proposta non è applicabile ai pazienti ospedalizzati per i quali il medico curante ospedaliero definirà la gestione e il follow-up, né ai pazienti</p>	https://solidarites-sante.gouv.fr/IMG/pdf/avis_conseil_scientifique_3_septembre_2020.pdf

	<p><i>immunodepressi, nei quali la diffusione del virus infettivo può essere prolungata).</i></p> <p>Casi asintomatici: 7 giorni (una settimana piena) prendendo come primo giorno quello della data di raccolta del campione positivo. Se dovessero comparire sintomi durante questo periodo, allungare il periodo di isolamento in modo che duri 1 settimana intera dal primo giorno di insorgenza dei sintomi/segni clinici.</p>	
Spagna	<p>10 giorni dopo la data inizio sintomi (o data diagnosi per asintomatici) e almeno 3 giorni dalla risoluzione della febbre e del quadro clinico.</p> <p>Casi asintomatici: 10 giorni dal test positivo.</p>	Ministerio de la Sanidad
UK	<p>Pazienti sintomatici o asintomatici con tampone positivo: -isolamento per 10 giorni dall'insorgenza dei sintomi o dalla raccolta del campione positivo.</p> <p>Interrompere isolamento dopo 10 giorni in assenza di sintomi ad eccezione di tosse e perdita di gusto o olfatto (questi ultimi possono durare più a lungo). Se febbre, continuare isolamento.</p>	Guidance. Stay at home: guidance for households with possible or confirmed coronavirus (COVID-19) infection
Paesi Bassi	Almeno 7 giorni dall'inizio dei sintomi e nessun sintomo da almeno 24 ore.	https://www.rivm.nl/en/novel-coronavirus-covid-19/quarantine
Germania	10 giorni dall'inizio dei sintomi (informazione riferita, documento in tedesco).	https://www.rki.de/DE/Content/InfaZ/N/Neuartiges_Coronavirus/Steckbrief.html
Irlanda nord	Almeno 10 giorni da inizio sintomi e assenza di febbre da almeno 48 ore.	https://www.publichealth.hscni.net/
Danimarca	<p>Pazienti sintomatici: almeno 48 dopo la scomparsa dei sintomi (ad eccezione di perdita di gusto e olfatto che possono durare a lungo).</p> <p>Casi asintomatici: 7 giorni dal test positivo.</p>	https://www.sst.dk/en/english/corna-eng/faq
Norvegia	<p>Pazienti sintomatici: almeno 8 giorni dall'inizio dei sintomi e assenza di sintomi da almeno 72 ore.</p> <p>(per i pazienti ospedalizzati o sottoposti a terapie immunodepressive il periodo di isolamento potrebbe essere più lungo).</p>	https://helsenorge.no/coronavirus/quarantine-and-isolation
Svezia	<p>Almeno 7 giorni dall'inizio dei sintomi e assenza di febbre da almeno due giorni (anche in presenza di tosse secca e perdita dell'olfatto).</p> <p>Pazienti asintomatici: 7 giorni dal test positivo.</p>	https://www.folkhalsomyndigheten.se/the-public-health-agency-of-sweden/

Alcuni *caveat* nelle evidenze attuali:

- In uno studio recente su personale infermieristico qualificato seguito prospetticamente per infezione asintomatica, è stato riscontrato, in uno studio dei 48 dipendenti infetti, un tampone nasofaringeo debolmente positivo a test di replicazione virale più di 20 giorni dopo la diagnosi iniziale; tuttavia, il campione non è stato sottoposto a passaggio seriale per dimostrare la presenza di virus competenti per la replicazione (Quicke et al., 2020).
- In un case report, è stato descritto un caso con malattia lieve in cui è stato identificato virus competente per la replicazione fino a 18 giorni dopo l'insorgenza dei sintomi (Liu et al., 2020).
- I dati attualmente disponibili sono derivati soprattutto da soggetti adulti; dati equivalenti su bambini e neonati sono limitati. In una recente revisione della letteratura (Walsh et al), non sono state osservate differenze relative a carica virale e durata di rilevamento del virus, tra adulti e bambini.
- Sono necessari più dati sulla diffusione virale in alcune situazioni, incluso nelle persone immunodepresse.

IPOTESI di modifica dei criteri per la re immissione in comunità .

Per le persone positive SARS-CoV-2 sintomatiche, almeno 14 giorni dalla comparsa dei sintomi, se i sintomi non sono più presenti da almeno 3 giorni, accompagnato dal riscontro di negatività a un test molecolare.

Per le persone positive SARS-CoV-2 asintomatiche, almeno 14 giorni dalla comparsa della positività accompagnato dal riscontro di negatività a un test molecolare. (*si può ipotizzare anche 10 giorni con tampone negativo*)

Per quanto riguarda coloro che, pur non presentando più sintomi, continuano ad avere risultati positivi al test molecolare, si ritiene opportuno considerare l'interruzione dell'isolamento dopo 21 giorni dalla comparsa dei sintomi se il paziente non presenta più sintomi da almeno una settimana e si riscontra una positività alla RT-PCR con valori di CT elevati . Questo criterio andrà modulato dalle autorità sanitarie d'intesa con esperti clinici e microbiologi/virologi anche tenendo conto dello stato immunitario delle persone interessate.

Per i contatti stretti di casi positivi SARS-CoV-2 identificati dalle autorità sanitarie considerato che il periodo di incubazione attualmente si stima essere da 1 a 14 giorni (mediana 5-6 giorni), oltre a quanto già previsto dalle circolari ministeriali (raccomandazione di un periodo di quarantena di 14 giorni dall'ultima esposizione al caso), la durata della quarantena può essere ridotta a 10 giorni dall'ultima esposizione qualora un test molecolare effettuato il decimo giorno sia risultato negativo. (European Centre for Disease Prevention and Control. Increased transmission of COVID-19 in the EU/EEA and the UK – 24 September 2020. ECDC: Stockholm; 2020.)

Si raccomanda infine di prevedere accessi al testing differenziati per i bambini.

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