Oxford COVID-19 Evidence Service

# What is the evidence for social distancing during global pandemics? A rapid summary of current knowledge

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## VERDICT

Although limited, the best available evidence appears to support social distancing measures as a means of reducing transmission and delaying spread. Staggered and cumulative implementation of these interventions may prove most effective. The timing and duration of such measures appear to be critical.

## BACKGROUND

In response to the COVID-19 pandemic, the UK government has now moved from its contain phase to a delay phase.[1]

Social distancing measures are being mandated, including self-isolation for anyone with specific symptoms. More social distancing measures are likely to be introduced, including self-isolation of the over 70s and higher risk groups, irrespective of symptoms and possibly for several months, to reduce their risk of virus exposure.[2]

The strategy has not had universal support. Last week, in an open letter to the Government, 501 UK based academic signatories and 40 distinguished international signatories wrote that “We consider the social distancing measures taken as of today as insufficient, and we believe that additional and more restrictive measures should be taken immediately, as it is already happening in other countries across the world.” [3] Those other countries include Italy, Spain, France, and Germany, where far wider restrictions are being implemented, including closure of schools and public spaces such as cafes, restaurants, cinemas, and most shops, and in some cases restrictions on when people can leave their homes.[4]

It is uncertain whether these measures are sufficient, or too limited, as there is currently little evidence on how to manage COVID-19. We have therefore assessed evidence from other scenarios, such as influenza pandemics, to inform potential social distancing strategies.

## CURRENT EVIDENCE

We found two notable systematic reviews. In preparation for World Health Organization (WHO) guidance, the Centers for Disease Control and Prevention in Atlanta, Georgia (CDC), posted (May 2020) a policy review of social distancing measures for pandemic influenza in non-healthcare settings (Fong 2020 review).[5] The Fong review "conducted separate systematic reviews to gather available evidence on the effectiveness of six measures to reduce community influenza transmission", as follows:

- isolating ill people
- tracing contacts
- quarantine of exposed people
- school dismissals or closures
- changes in the workplace
- avoiding crowds and restricting movement

We also identified the review by Rashid and colleagues who conducted a systemized review on social distancing and other related measures for response to an influenza pandemic (Rashid 2015 review).[6] We used these reviews as our primary sources of descriptive data. However, we supplemented the published review findings by conducting a rapid restricted search of PubMed to identify any other relevant information since the above reviews were published (see the search strategy at the end of the article).

### 1. Isolating ill people

The Fong 2020 reviewers found 15 studies. One study broadly defined case isolation as "separation or restriction of movement of ill persons with an infectious disease at home or in a healthcare facility to prevent transmission to others". The reviewers found eight studies that reported a reduced attack rate through case isolation measures. Case isolation may also delay the peak of the epidemic. For example, the reviewers found one study that reported that case isolation of 40% of cases could delay the epidemic by 83 days compared with no intervention. Other studies also indicated possible benefits, although the scale of the delay varied. They also found uncertainty about the duration of self-isolation. Some authors recommended isolation until the fever had abated, while others advised waiting until 5–7 days after the onset of the illness.

### 2. Tracing contacts

The Fong reviewers identified four simulation studies of contact tracing. Contact tracing showed some benefit, particularly when combined with other social distancing measures. However, there was variability in the size of the potential benefit. In one study contact tracing, in combination with other measures, could reportedly delay the peak of a pandemic by about 6

weeks. However, considerable resources are needed for contact tracing, with limited evidence of cost-effectiveness. The sustainability of contact tracing may become a problem, and the intervention may need to be limited to individuals at higher risk or in small communities at risk to others.

**3. Quarantine of exposed persons**

The Fong reviewers identified data from 16 studies. Although the evidence for home quarantine was moderate, there was a large enough signal to suggest that it may be effective in slowing transmission, particularly with high adherence (e.g. >70%).

The Rashid 2015 review included a modelling study where “quarantining 50% of all case contacts over a period of 4 weeks before the epidemic peak, reduced the peak case-load and attack rate by 25%, and 1.5% respectively and delayed the peak by around 1 week.”

***Secondary impacts***

The Fong reviewers highlighted the need to consider the economic and social costs of these interventions. For example, the benefits of quarantine would need to be taken in the context of the risk to other household members, a risk that might increase the longer the period of quarantine continues.

Similarly, the Rashid 2015 review highlighted the risk of cross house contamination. The review included an observational study in Chinese university students and reported “a significant increase in rates of Influenza Like Illness (ILI) for students quarantined in a room with a confirmed case of H1N1 pandemic influenza over those not exposed to a H1N1 case (26% versus 6%, P=0.02).”

**4. School dismissals or closures**

By far the largest volume of evidence for any single intervention relates to school closures (101 studies). School closures were effective in reducing transmission during influenza pandemics, although the optimal timing and duration are not clear**.** The reviewers identified two main types of studies: those in which most students were sent home and only some teachers and administrators remained to support children from low-income environments who needed school meals (school dismissal); and studies of full school closure. However, the reviewers did not deal separately with the data from these two different scenarios.

Forced closure soon before a planned school holiday (e.g. a few weeks before Easter) may have benefits. Some caution about when to reopen schools may be needed, as there is evidence of increased infection rates after reopening. Any negative effects of prolonged closure need to be considered, including encouraging unwanted contacts in other social spaces and an increase in parental responsibilities, which could deplete workforces in other essential areas. It is worth noting that the effect of influenza in children appears to be different to that of COVID-

19, typically milder. However it is not known if underlying co-infection is more common in children than adults.[7,8]

***Secondary impacts***

The Rashid 2015 reviewers highlighted the considerable secondary social and economic impacts of school closures, including evidence that "16-45% of parents would need to take leave to supervise children at home, 16-18% of parents would lose income, and about 20% of households would have difficulty arranging childcare." The authors identified one UK based model that estimated that the cost of school closures could be "£0.2 billion – £1.2 billion per week, amounting to around 0.2–1% of GDP for school closure over a pandemic wave (around 12 weeks)." The reviewers also noted that "a comparative analysis of public health measures for pandemic mitigation found that continuous universal school closure was less cost-effective than stockpiling antiviral drugs or pre-pandemic vaccines, with school closure 14 or 21 times more costly for equivalent morbidity and mortality benefits than intervention strategies with antivirals or pre-vaccination respectively." They also highlighted the social risks, including the possibility that children might be left with inadequate care, be left with under-age siblings, and have reduced support for free meals.

***Implementing social distancing in schools***

Our supplementary search identified an additional study from Faherty and colleagues, who conducted a qualitative study "to explore the perspectives of school and preparedness officials on the feasibility of implementing a range of social distancing practices to reduce influenza transmission during a pandemic".[9]

Key themes to support optimal implementation of social distancing in schools included:

- the need to secure "buy-in" between teaching leads, parents, and wider stakeholders;
- using this buy-in to sustain appropriate behaviours outside of schools;
- adequate consideration of the potential negative impacts, while prioritizing student safety and considering combining different practices;
- increasing the availability of extra resources;
- the need to make decisions collaboratively;
- where feasible and appropriate, inclusion of flexibility to adapt national guidance to local contexts.

As of March 2020, the WHO have released "Key Messages and Actions for COVID-19 Prevention and Control in Schools".[10]

**5. Changes in the workplace**

The Fong 2020 reviewers identified 18 studies. Overall, there was some evidence that implementing workplace measures, e.g. remote working, staggered shifts, and extended holidays, could slow down transmission and delay the epidemic peak, although the size of the

effect varied. For example, one simulation study showed “that nationwide closure of schools and workplaces for weeks would delay the time of peak occurrence by 5–8 days”. The impact on University closures appeared less certain.

***Secondary impacts***

The timing of workplace changes, and the possible social and economic implications, need careful consideration. The Rashid 2015 reviewers highlighted the potential for considerable loss of income by employees facing work closures, as well as the risk that supply chains would be halted for essential and important goods.

**6. Avoiding crowds and restricting movement**

Three studies were identified in the Fong review. Limited evidence suggested that avoidance of mass gatherings may be beneficial, but there was considerable uncertainty on the size of the crowd that would constitute a gathering. One study reported that a ban on public gatherings, in combination with other interventions, for a median of 4 weeks, could reduce the weekly death rate. There was some evidence of a positive correlation between the duration of the ban and a reduced death rate.

The Rashid 2015 review reported one included modelling paper that suggested that “mass gatherings shortly before an epidemic peak could increase the peak height by about 10%, but at other times the impact would be small.”

The Rashid 2015 reviewers reported that there was “not a universal consensus from modelling studies on the impact of restrictions on movement.” They reported one study that showed that “moderate delays (1–1.5 weeks) could be achieved by strict internal mobility restrictions (>50% reduction in mean travel frequency) applied in the early stages of the pandemic for a period of 2-4 weeks.” However, they cited another modelling study that showed that “weak travel restrictions (10% travel restrictions) might actually increase attack rates due to preventing travelers transmitting more infections within their local area”.

## EMERGING EVIDENCE IN COVID-19

Given its novelty, information on the effects of social distancing during the current COVID-19 pandemic is limited but emerging.

Several social distancing strategies, including city-wide lockdowns, screening measures at train stations and airports, active case finding, and isolation of suspected cases, appear to be slowing down the transmission of COVID-19 outside of Hubei province.[11]

Mathematical modelling of measures to slow COVID-19 transmission rates in South Korea [12] suggested that preventive measures such as social distancing were crucial, among a variety of other measures, in reducing the spread of the virus.

Data-driven models of COVID-19 spread in China, called susceptible-exposed-infectious-quarantine-recovered (SEIQR) models [13], showed that substantial social distancing for 30 days had significant benefits in Wuhan and Hubei. The models suggested that the greatest benefit could be had with early stepwise implementation of social distancing measures, beginning in the area with the highest prevalence. However, timing was crucial; too early and the beneficial effect was partly neutralized.

The results of a recent modelling study of UK cases of COVID-19 have reinforced the need for social distancing measures as a package of interventions. The authors concluded that the effectiveness of any one intervention in isolation is likely to be limited and that interventions need to be combined to have a substantial effect on transmission. They described a combination of home isolation of suspected cases, home quarantine of those living in the same household, and social distancing of elderly people and others at most risk of severe disease as optimal mitigation policies, which might reduce peak healthcare demand by 2/3 and deaths by a half. The authors noted that "stopping mass gatherings is predicted to have relatively little impact (results not shown) because the contact-time at such events is relatively small compared to the time spent at home, in schools or workplaces and in other community locations such as bars and restaurants." They also highlighted the possible need for an extended duration of time when these measures may need to remain in place, to avoid a rebound in transmission and until a vaccine becomes available.[14]

Public Health England have also published guidance on Guidance on social distancing for everyone in the UK and protecting older people and vulnerable adults.[15]

**CONCLUSIONS**

- Global data on COVID-19 continue to be collected. They must be actively analysed and used to support real-time decision making. However, until this evidence base grows, current COVID-19 policies may rely on inferences from other scenarios, such as influenza pandemics.
- Although limited, the best available evidence appears to support social distancing measures as a means of reducing transmission and delaying spread.
- Staggered and cumulative implementation of these interventions may prove most effective.
- The timing and duration of such measures appear to be critical.
- The breadth of measures, including "community wide containment",[16] needs to be considered in the context of the likely benefit to harm balance, economic costs, and the potential for increasing infection rates once the measures are removed.

End.

**Disclaimer**: the article has not been peer-reviewed; it should not replace individual clinical judgement and the sources cited should be checked. The views expressed in this commentary represent the views of the authors and not necessarily those of the host institution, the NHS, the

NIHR, or the Department of Health. The views are not a substitute for professional medical advice.

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## Search terms

We used the following search terms: “social distancing[tiab] AND ((("pandemics"[MeSH Terms] OR "pandemics"[All Fields] OR "pandemic"[All Fields]) OR ("influenza, human"[MeSH Terms] OR ("influenza"[All Fields] AND "human"[All Fields]) OR "human influenza"[All Fields] OR "influenza"[All Fields])) OR ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields])) AND ("2018/08/01"[PDAT] : "3000/12/31"[PDAT]))” for evidence (e.g. primary studies, modelling studies or systematic reviews) since the Fong review search was conducted (August 2018).

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