The Strategy Unit.

COVID-19 and Coronavirus evidence alerting

Rapid scan 3: Impacts of lifting restrictions

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NHS
Midlands and Lancashire
Commissioning Support Unit

The Strategy Unit is working in collaboration with the Health Foundation, King's Fund, Nuffield Trust, and Imperial College Healthcare Partners to provide additional analytical support to the NHS nationally in its overall response to COVID-19. The organisations will use their expertise to focus on questions that the NHS may lack the immediate resources to look at, which may be more medium-term, cut across sectors, or benefit from independent analysis. They will be sharing their knowledge, information, multi-disciplinary analytical skills, and extensive links to support different parts of the health and care system, arms-length bodies and government departments working on the COVID-19 response. For more information please email mlcsu.covid.analytics@nhs.net.

This rapid summary is part of an evidence alert service which has developed from requests for evidence to support recovery planning. Our first priority is to highlight key papers to inform decisions, policy and planning and our approach is pragmatic rather than exhaustive. More information on our methodology is provided in the Appendix.

A short note about evidence analysis and COVID-19

The emerging evidence base on COVID-19 and Coronavirus is growing quickly. The research community has responded to the pandemic quickly and publishers are fast-tracking papers and providing open access. This inevitably leads to some trade-offs:

- Findings are shared quickly but there are implications for quality as the usual peer review is curtailed - so we need to be mindful of bias in research methods and quality of reporting.
- The pace of learning is such that, at the moment, it is not feasible to conduct a traditional review which summarises and synthesises what we know. The evidence base is growing so quickly that our understanding is continually shifting.

Our approach is to trawl the rapidly growing knowledge base, to filter findings which are relevant to planning and policy and to highlight new and emerging learning:

- This rapid scan provides a snapshot of emerging evidence.
- A weekly alert will highlight new papers.
- We will also maintain an evidence tracker, providing a single point of access to the papers highlighted in this scan and in weekly alerts.

There are, of course, initiatives around the UK and internationally to scan and track evidence and we'll endeavour to avoid duplication as far as possible.

Introduction

As countries consider maintaining or relaxing lockdown restrictions it will be crucial to decision-making to have an informed understanding of how such measures could impact the population, the economy and levels of disease transmission.

This rapid summary has been created to collate new and emerging evidence on the impacts of lifting lockdown restrictions and transferable lessons from previous pandemics and major incidents.

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Summary

Lockdown, mental health and psychological wellbeing

The evidence reviewed suggests that lockdown restrictions have a substantial impact on psychological wellbeing, symptoms of mental ill health (PTSD; depression) and levels of distress. It is also noted that lockdown policies may impact certain vulnerable groups more adversely than others (e.g. homelessness) Consideration and planning for lifting lockdown restrictions should take into account the potential long-term impact of quarantine on the population and the potential need for support post-lockdown.

Exit strategies

Available evidence suggests that any relaxation of restrictions (intermittent or gradual) should be accompanied by complementary and comprehensive measures (e.g. large scale testing; contact tracing) to reduce the likelihood of a resurgence in infection rates. Without such measures, subsequent waves of infection are likely.

Impact on healthcare system demand

Some studies model the potential impact of lifting restrictions on healthcare system demand. Studies from France and Italy suggest that without complementary measures to manage the spread of infection, lifting restrictions totally or intermittently would likely lead to a resurgence in cases, and overwhelming levels of demand on the healthcare system in the long-term (particularly for intensive-care capacity).

Guidance

World Health Organization	“Immunity passports” in the context of COVID-19 https://www.who.int/publications-detail/immunity-passports-in-the-context-of-covid-19 [1]
WHO Regional Office for Europe	Strengthening and adjusting public health measures throughout the COVID-19 transition phases http://www.euro.who.int/__data/assets/pdf_file/0018/440037/Strength-AdjustingMeasuresCOVID19-transition-phases.pdf?ua=1 [2]

Policy considerations

Institute for Government	Lifting lockdown: how to approach a coronavirus exit strategy https://www.instituteforgovernment.org.uk/publications/lifting-lockdown-coronavirus-exit-strategy [3]
The Policy Institute, Kings College London and Ipsos MORI	Life under lockdown: coronavirus in the UK https://www.kcl.ac.uk/policy-institute/assets/coronavirus-in-the-uk.pdf [4]

Rapid reviews

International Public Health Responses to COVID-19 Outbreak: A Rapid Review

Tabari P; Amini M; Moghademi M; and Moosai M (2020). Iranian Journal of Medical Sciences [5]

This rapid review of 50 articles (in addition to 12 web-pages) reviews international public health strategies and responses to COVID-19. These were divided into four main areas:

- Monitoring
- Public education
- Crowd controlling
- Care facilities

"According to the results of the management decisions of some governments on quarantining, social isolation, screening methods, and flight suspensions due to the severity and anonymity of COVID-19, it is highly assured that these strategies would be the most successful approaches to confront the present pandemic. Governments should put in place timely and strict measures to halt the spread and diminish its unintended deadly consequences."

"[..] quarantine and social isolation would be successful techniques to confront the COVID-19 pandemic and an immediate response is a key factor to halt the spread."

Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review

Nussbaumer-Streit B et al. (2020) Cochrane Database of Systematic Reviews [6]

This rapid review of 29 studies (10 modelling studies on COVID; 4 observational studies and 15 modelling studies based on SARS and MERS) assessed the effects of quarantine (alone or combined with other measures) for individuals in contact with confirmed cases of COVID-19, having travelled from or residing in countries/ regions with a declared outbreak or high transmission.

It was found that:

- Modelling studies consistently reported a benefit of the simulated quarantine measures- quarantine of people exposed to confirmed or suspected cases averted 44% to 81% incident cases and 31% to 63% of deaths compared to no measures based on different scenarios (incident cases: 4 modelling studies on COVID-19, SARS; mortality: 2 modelling studies on COVID-19, SARS, low-certainty evidence)
- When models combined quarantine and other prevention and control measures, they demonstrated larger effects on the reduction of new cases, transmissions and deaths than did individual measures alone.
- Previous studies on MERS and SARS were consistent with these findings.

Rapid reviews

How to improve adherence with quarantine: rapid review of the evidence,

Webster RK et al. (2020) *Public health* [7]

This rapid evidence review looked at 14 studies (3163 screened) from the peer-reviewed literature on the reasons attributed to quarantine adherence, and factors associated with this. [Studies based on previous outbreaks such as Swine flu, Ebola, Mumps, SARS]
Adherence to quarantine was variable and ranged from 0 to 92.8% in included studies. The main factors which influenced adherence, or were found to be associated with adherence decisions were:

- Knowledge people had about the disease and quarantine procedure
- Social norms
- Perceived benefit of isolation versus perceived risk of disease
- Practical issues such as running out of supplies, or financial consequences of isolation (e.g. unable to earn) were also prominent

"To improve this, public health officials should provide a timely, clear rationale for quarantine and information about protocols; emphasise social norms to encourage this altruistic behaviour; increase the perceived benefit that engaging in quarantine will have on public health; and ensure that sufficient supplies of food, medication and other essentials are provided."

The psychological impact of quarantine and how to reduce it: rapid review of the evidence,

Brooks SK et al. (2020) *The Lancet* [8]

This rapid review of 24 papers examined the psychological impact of quarantine across three electronic databases.

- Most studies reported negative psychological effects in line with post-traumatic stress symptoms, confusion and anger.
- The psychological impact of quarantine is wide-ranging, substantial and may be long-lasting.

Several stressors appear to be prominent in the post-quarantine period:

- Finances
- Stigma from others as a result of quarantine or diagnosis

Results suggest steps may be taken to make quarantine as tolerable as possible by: providing information (clearly telling people what's happening and why); and, ensuring meaningful activities and adequate basic supplies are available.

- *"the results of this Review suggest there can be long-term consequences that affect not just the people quarantined but also the health-care system that administered the quarantine and the politicians and public health officials who mandated it."*

Emerging Covid-19 evidence *(not peer-reviewed)*

The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak.

Chinazzi M et al. (2020) [9]

This global metapopulation disease transmission model examined the impact of travel restrictions upon national and international spread of COVID-19. Based on internationally reported cases, this model looks at the start of the travel ban from Wuhan (23 Jan 2020) and considers several scenarios with variable dates for lifting lockdown:

- even in the presence of the strong travel restrictions in place to and from Mainland China since 23 January 2020, a large number of individuals exposed to the SARS-CoV-2 have been traveling internationally without being detected.
- while the Wuhan travel ban was initially effective at reducing international case importations, the number of cases observed outside Mainland China will resume its growth after 2-3 weeks from cases that originated elsewhere

On the impact of lifting restrictions prematurely, the authors reflect that:

- "*Restrictions on activities in Wuhan, if maintained until April, would probably help to delay the epidemic peak. Our projections suggest that premature and sudden lifting of interventions could lead to an earlier secondary peak, which could be flattened by relaxing the interventions gradually. However, there are limitations to our analysis, including large uncertainties around estimates of R0 and the duration of infectiousness.*"

Shut down and reboot—preparing to minimise infection in a post-COVID-19 era.

McCall B (2020) The Lancet Digital Health [10]

This Lancet editorial comments on preparatory efforts and strategies to minimise infection rates as lockdown restrictions are tentatively lifted.

- judicious use of digital technology, including contact tracing apps, may play an important role in lockdown exit strategies to minimise the risk of a second wave of infections.
- The authors highlight several examples of contact tracing apps internationally, and similar efforts to minimise infection (and the severity of a second wave of infections) as restrictions are lifted.

Emerging Covid-19 evidence *(not peer-reviewed)*

Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period

Kissler SM; Tedijanto C; Goldstein E; Grad YH; and Lipsitch M (2020) *Science* [11]

This study used time-series data from the USA to inform a model of SARS-CoV-2 transmission.

- This projected recurrent outbreaks at wintertime after the initial most severe pandemic wave
- In the absence of other interventions to mitigate spread, a key metric for whether social distancing policies have succeeded should be the balance between critical care capacity and demand
- To avoid demand exceeding critical care capacity, the authors purport that prolonged or intermittent waves of social distancing may be necessary up to 2022.
- Interventions to expand hospital critical care capacity may improve the success of intermittent social distancing
- The authors urge caution, and that continued surveillance is necessary given a lack of robust serological evidence to indicate the extent and duration of immunity.

An unprecedented challenge Italy's first response to COVID-19

WHO Regional Office for Europe (2020)

This report tells the story of the first phase of Italy's response to the COVID-19 virus, which in many people transformed into the dreaded illness known as COVID-19, leading to unprecedented death tolls across the world.

- Compliance with the restrictions has been remarkably good; Initial reservations about the lockdown nevertheless were quickly replaced by overwhelming consensus and adherence.
- After almost seven weeks, people had grown tired of the lockdown. Most recognized that without the measures the epidemic would have been even worse, but their side-effects started to weigh in
- Early warning signs also appeared about the mental well-being of families living in confined spaces and facing catastrophic living expenses, as well as for the mental health consequences of the epidemic for frontline health workers

This report also highlights considerations and measures to support vulnerable groups for whom following lockdown measures may be complex, with unintended consequences:

- *"Lockdown measures are especially complex to follow for those without a home, an issue that becomes even more dramatic due to the inevitable closure of many shelters run by third sector organizations during quarantine."*
- *"Not everyone is safe at home, and while lockdown is essential in blocking the spread of the virus, it can pose serious risks to the well-being of women and children in abusive households. "*

Emerging Covid-19 evidence *(not peer-reviewed)*

Evaluation of the Effectiveness of Surveillance and Containment Measures for the First 100 Patients with COVID-19 in Singapore - January 2-February 29, 2020

Ng Y et al. (2020). *Morbidity and Mortality Weekly Report* [12]

This epidemiological study reports on the effectiveness and impact of surveillance and containment measures for the first patients with Covid-19 in Singapore, in context to the multipronged surveillance strategy adopted

As of March 5, n=117 cases had been identified, with the following methods used to identify cases:

- Case definition and contact tracing identified 73 patients
- 16 were detected via enhanced surveillance
- And 11 were identified via laboratory testing

Overall, the 7-day moving average of the interval from symptom onset to isolation in hospital or quarantine indicated significant decreasing trends for local and imported cases.

The authors conclude that "*Rapid identification and isolation of cases, quarantine of close contacts, and active monitoring of other contacts have been effective in suppressing expansion of the outbreak and have implications for other countries experiencing outbreaks.*"

Emerging Covid-19 evidence *(not peer-reviewed)*

Expected Impact of Lockdown Île-de-France and possible exit strategies

Di Domenico L; Pullano G; Sabatini CE; Boëlle PY; and Colizza (2020) medRxiv. [13]

This stochastic age-structured transmission model assesses the expected impact of lockdown in the Île-de-France region, while also evaluating the potential impact of several lockdown exit strategies. This integrates data of age profile and social contacts, as well as syndromic and virologic surveillance data.

- The authors conclude that a combination of extensive case-finding, large scale testing and isolation may be required to allow for relaxation of certain social distancing measures (e.g. more individuals in work; reopening certain businesses) without a resurgence in infection rates and healthcare demand exceeding capacity.

- *"Lifting the lockdown with no exit strategy would lead to a second wave largely overwhelming the healthcare system"*

Between Geography and Demography: Key Interdependencies and Exit Mechanisms for Covid-19.

Scala et al. (2020) [14]

This modelling study uses a minimal compartmental model to analyse mobility restriction policies in Italy during the Covid-19 outbreak- based on geographic groups and age classes. The impact of various lockdown scenarios and exit strategies was also modelled via introducing differences in model parameters across models.

- Premature lockdown fails to impact or shift the rate of transmission in time
- Beyond a critical value of lockdown strength, epidemics which appear to be quelled may resurge fully after lifting restrictions
- Through considering Italian regions as separate administrative entities it was shown that epidemics may develop independently in different regions once the initial outbreak starts.
- *"both young people (0-19) and elderly people (70+) are the most interconnected classes and therefore can have a greater influence on the post-lockdown phase. We show that while confirming [sic] quarantine policies to only elderly people can limit the possibility of a renewed upward phase in the contagion dynamics, relaxing the lockdown measures to only the middle age class (20-69) can be enough to smooth and lessen the propagation of contagion in the post-lockdown phase"*

Lessons from previous pandemics and major incidents

'Community Psychological and Behavioral Responses through the First Wave of the 2009 Influenza A(H1N1) Pandemic in Hong Kong',

Cowling BJ et al. (2010) *Journal of infectious diseases* [15]

This analysis of community responses to the H1N1 (Influenza A) pandemic examined trends in anxiety, perceptions of risk, and knowledge of disease transmission and preventive behaviours, in response to community mitigation measures. It was found that:

- greater anxiety was associated with lower reported use of hygiene measures and increased social distancing
- Knowledge of disease transmission via indirect contact in the general population was not associated with changes in preventive behaviours

Notably:

- *"The association between social distancing and anxiety raises the possibility of unavoidable economic consequences associated with emerging infectious disease epidemics. Our results highlight the difficulty of relying on community mitigation measures during a pandemic, because habitual behaviours like hygiene may be hard to change in response to an acute epidemic. More sustained and integrated attempts should therefore be considered"*

SARS control and psychological effects of quarantine, Toronto, Canada

Hawryluck L et al. (2004) *Emerging infectious diseases* [16]

This web-based survey study looked at n=129 people who were quarantined during the SARS outbreak.

- This showed a high prevalence of psychological distress, as well as symptoms of PTSD and depression in 28.9 and 31.2% of respondents, respectively.
- longer quarantine durations were associated with increased prevalence of PTSD symptoms

"Our data show that quarantine can result in considerable psychological distress in the forms of PTSD and depressive symptoms. Public health officials, infectious diseases physicians, and psychiatrists and psychologists need to be made aware of this issue. They must work to define the factors that influence the success of quarantine and infection control practices for both disease containment and community recovery and must be prepared to offer additional support to persons who are at increased risk for the adverse psychological and social consequences of quarantine."

Lessons from previous pandemics and major incidents

Economic analysis of pandemic influenza mitigation strategies for five pandemic severity categories.

Kelso et al. (2013) *BMC Public health.* [17]

This economic analysis examined the effectiveness and total cost of a range of pandemic influenza mitigation strategies for 5 categories of pandemic severity, based on simulation modelling of a community of approx. 30,000 people in Australia.

- For severe pandemics of category three or greater (case fatality rate=0.75 to 2.5%), combined antiviral treatment and prophylaxis, and more stringent containment measures (extended schools closure and community contact reduction) resulted in the lowest total cost of any strategy ($1,584 per person at category 5).

- *"For pandemics in high severity categories the strategies with the lowest total cost to society involve rigorous, sustained social distancing, which are considered unacceptable for low severity pandemics due to societal disruption and cost".*

Effectiveness of workplace social distancing measures in reducing influenza transmission: a systematic review.

Ahmed F; Zviedrite N; Uzicanin A (2018) *BMC Public health* [18]

This systematic review of 15 studies (12 modelling studies and 3 epidemiological studies) examined the impact of social distancing in non-healthcare workplaces,

- social distancing was estimated to be less effective for higher R0 value.
- Delayed triggering of workplace social distancing also precludes the opportunity to impact cases that have already occurred and represents a missed opportunity to diminish further transmission.

"Decision-makers should weigh the benefits versus disruptions of implementing workplace social distancing measures in the context of pandemic severity [46]. Third, effectiveness declined with lower compliance. Triggering social distancing too early can contribute to lower compliance because of intervention fatigue [54]. Finally, effectiveness was reported to be greater when workplace social distancing was combined with other nonpharmaceutical or pharmaceutical interventions. The findings underscore the importance for coordination between employers and state/local health departments to potentially enhance impact using a combination of measures."

Lessons from previous pandemics and major incidents

Use of quarantine in the control of SARS in Singapore.

Doi PL; Lim S; Chew SK (2005). *American Journal of Infection Control.* [19]

With 283 cases of SARS recorded in Singapore in 2003, around 7,863 contacts of SARS cases were also issued home quarantine orders (HQOs).

- In addition to this the Singaporean government mobilised other large scale quarantine operations including contact tracing, surveillance, enforcement and health education
- Despite social education and financial support by the government, some who were quarantined reported problems associated with stigmatization by their neighbours. Research is required in this important area to weigh the benefits of large-scale quarantine actions against the adverse consequences.

"The main lesson to learn from the SARS outbreak is the capability of an emerging infection to cause a pandemic in a short span of time and the paradigm shift needed to respond to such a disease";

"Singapore's experience underscored the importance of being prepared to respond to challenges with extraordinary measures. To improve the yield for quarantine, we need to refine the criteria as to which contacts constituted higher risk and should be served the HQO. Imposition of large-scale quarantine should be implemented only under specific situations in which it is legally and logistically feasible."

Nonpharmaceutical interventions implemented by US cities during the 1918-1919 influenza pandemic.

Markel H et al. (2007) *Journal of the American Medical Association (JAMA)* [20]

This study used historical archival research and previous statistical and epidemiological analyses to examine the impact of non-pharmaceutical interventions by US cities upon the 1918 Influenza pandemic. Non-pharmaceutical interventions were grouped into 3 categories: school, closure, restriction of public gatherings; and isolation and quarantine. School closures and restrictions to public gatherings were the most common interventions:

- Cities implementing interventions earlier experienced greater delays to peak mortality (Spearman r= -0.74, P<0.001); lower peak mortality (Spearman r= 0.36, P=0.02); lower total mortality (Spearman r=-0.39, P=0.005).
- Increased duration of these interventions was significantly associated with reductions in total mortality burden (Spearman r = −0.39, P = .005)

"Nonpharmaceutical interventions can play a critical role in mitigating the consequences of future severe influenza pandemics (category 4 and 5) and should be considered for inclusion in contemporary planning efforts as companion measures to developing effective vaccines and medications for prophylaxis and treatment. The history of US epidemics also cautions that the public's acceptance of these health measures is enhanced when guided by ethical and humane principles.[39-41]"

Lessons from previous pandemics and major incidents

Understanding, compliance and psychological impact of the SARS quarantine experience.

Reynolds EL et al. (2008) *Epidemiology & Infection* [21]

This postal questionnaire study of n=1912 Canadian adults affected by the 2003 SARS outbreak looked at the attitudes and perceptions of this group towards quarantine.

- This showed low levels of adherence to quarantine (15.8±2·3%), however, levels of adherence were significantly higher when the rationale for quarantine was understood ($P<0.05$).
- Healthcare workers had significantly higher levels of psychological distress and symptoms of post-traumatic stress disorder ($P<0.001$)
- Recommendations include that *"low compliance with quarantine requirements introduces concerns about the effectiveness of quarantine as a public health measure. Improvements in compliance and reduced psychological distress may be possible by minimizing duration, revising requirements, and providing enhanced education and support."*

Effects of reactive social distancing on the 1918 influenza pandemic.

Yu D; Lin Q; Chiu APY; and, He D (2017) PLoS ONE [22]

This peer-reviewed study modelled the effects of reactive social distancing (along with model parameters) on three epidemic waves of the 1918 Influenza pandemic in London boroughs, Liverpool and Birmingham.

- This showed the importance of reactive social distancing in reducing the severity of subsequent waves of infection.
- Notably, across waves of infection the authors outline a potential feedback loop between declining rates of influenza deaths (as a result of social distancing) and reductions in the public's perception of risk of infection.
    - It was noted that as fewer people comply with social distancing as a result of reduced perception of risk, this could induce subsequent epidemic waves.

" where reactive social distancing in response to the high recent proportion of influenza deaths could lead to a dampening of epidemic waves. However, with the decline in the proportion of influenza deaths, public risk perception could be lowered as well, leading to less social distancing which could eventually induce another epidemic wave. In addition, we showed that reactive social distancing could lead to reduction in final epidemic size."

Lessons from previous pandemics and major incidents

Public health measures to control the spread of the severe acute respiratory syndrome during the outbreak in Toronto.

Svoboda T et al. (2004) ***New England journal of medicine*** [23]

Enhanced infection control and contact tracing resulted in a sharp drop in SARS transmission in Toronto hospital and outpatient settings:

- Resurgence in transmission rate/number of cases were identified in people with certain risk factors- this reportedly led to changes in outbreak control strategies. One resurgence of cases occurred after relaxation of hospital and community infection control.
- re-initiation of these procedures reportedly prevented second and third degree transmission within the community.
- In those who are exposed to SARS during inpatient stays in hospital, a longer period of postexposure isolation and monitoring may be appropriate

Lessons from previous pandemics and major incidents

Lessons from the history of quarantine, from plague to influenza A.

Tognotti E (2013) Emerging Infectious Diseases. [24]

This historical review concerning the history of "Quarantine" highlights lessons learned from previous infections diseases incidents.
It was found that:

- *"strategies varied among the countries hardest hit by SARS (People's Republic of China and Hong Kong Special Administrative Region; Singapore; and Canada).*
- *"In Canada, public health authorities asked persons who might have been exposed to SARS to voluntarily quarantine themselves. In China, police cordoned off buildings, organized checkpoints on roads, and even installed Web cameras in private homes. There was stronger control of persons in the lower social strata (village-level governments were empowered to isolate workers from SARS-affected areas).*
- *"Public health officials in some areas resorted to repressive police measures, using laws with extremely severe punishments (including the death penalty), against those who violated quarantine. As had occurred in the past, the strategies adopted in some countries during this public health emergency contributed to the discrimination and stigmatization of persons and communities and raised protests and complaints against limitations and travel restrictions."*

Restrictive measures in an influenza pandemic: a qualitative study of public perspectives.

Smith MJ; Bensimon CM; Perez DF; Sahni SS; and, Upshur REG (2012) *Canadian Journal of public health* [25]

A series of town hall focus groups across three Canadian regions aimed to elicit the perspectives of Canadians on ethical use of infection-control measures which restrict civil liberties in context to Influenza.

- Two main themes were highlighted by focus groups: 1) Creating an environment to support compliance with lockdown through communication rather than enforcement; 2) establish a clear dividing line or balance between individual rights, community values and the "greater good".

The authors highlighted the potential benefits of *"a more tractable approach to restrictive measures [...] one that enables individuals to voluntarily comply by creating an environment to compel compliance based on communication. This approach requires restrictive measures to be a) proportional to the threat, b) implemented along with reciprocal arrangements provided to those affected, and c) accompanied by open and transparent communication throughout all stages so that citizens can both understand and participate in decision-making"*

Lessons from previous pandemics and major incidents

Public perceptions of quarantine: community-based telephone survey following an infectious disease outbreak.

Tracy CS; Rea E; and Upshur REG (2009) *BMC Public health.* [26]

This telephone survey of the general population in Greater Toronto (CA) (n=500) indicated strong public support for the use of quarantine measures when these were deemed to be required, there was also support for legal sanctions for failure to comply.

However, public support was contingent upon legal safeguards and psychological support for those affected by quarantine:

- *"In order to engender strong public support for the use of quarantine and other restrictive measures, government officials and public health policy-makers would do well to implement a comprehensive system of supports and safeguards, to educate and inform frontline public health workers, and to engage the public at large in an open dialogue on the ethical use of restrictive measures during infectious disease outbreaks."*

Comparing nonpharmaceutical interventions for containing emerging epidemics.

Peak CM; Childs LM; Grad YH; and, Buckee CO (2017) *Proceedings of the National Academy of Sciences of the United States of America.* [27]

This agent –based branching model compared the effectiveness of quarantine and symptom monitoring interventions across case-studies for several influenza like diseases (implemented through contract tracing)

The authors highlight the absence of a systematic framework to assess the relationships between a given containment strategy (e.g. duration of quarantine), and the natural history and epidemiology of specific pathogens.

They conclude that *"comparative effectiveness of symptom monitoring and quarantine depends critically on the natural history of the infectious disease, its inherent transmissibility, and the intervention feasibility in the particular healthcare setting. The benefit of quarantine over symptom monitoring is generally maximized for fast-course diseases, but we show the conditions under which symptom monitoring alone can control certain outbreaks. This quantitative framework can guide policymakers on how best to use nonpharmaceutical interventions and prioritize research during an outbreak of an emerging pathogen."*

Commentary

Date	Organisation	Authors	HyperLink title and reference
14/04/20	University of Brussels and University of Namur, Belgium	Marius Gilbert, Mathias Dewatripont, Eric Muraille, Jean-Philippe Platteau and Michel Goldman	Preparing for a responsible lockdown exit strategy [28]
25/03/20	UCL, UK	Tim Colbourn	Covid-19: Extending or relaxing distancing control measures [29]

Ongoing studies

Study title	Study type	Country	Link
Life under lockdown: coronavirus in the UK	Survey	United Kingdom	https://www.kcl.ac.uk/policy-institute/assets/coronavirus-in-the-uk.pdf [30]
Psychological and social effects of Covid-19	Social Study	United Kingdom	https://www.ucl.ac.uk/news/2020/mar/new-study-psychological-and-social-effects-covid-19 [31]

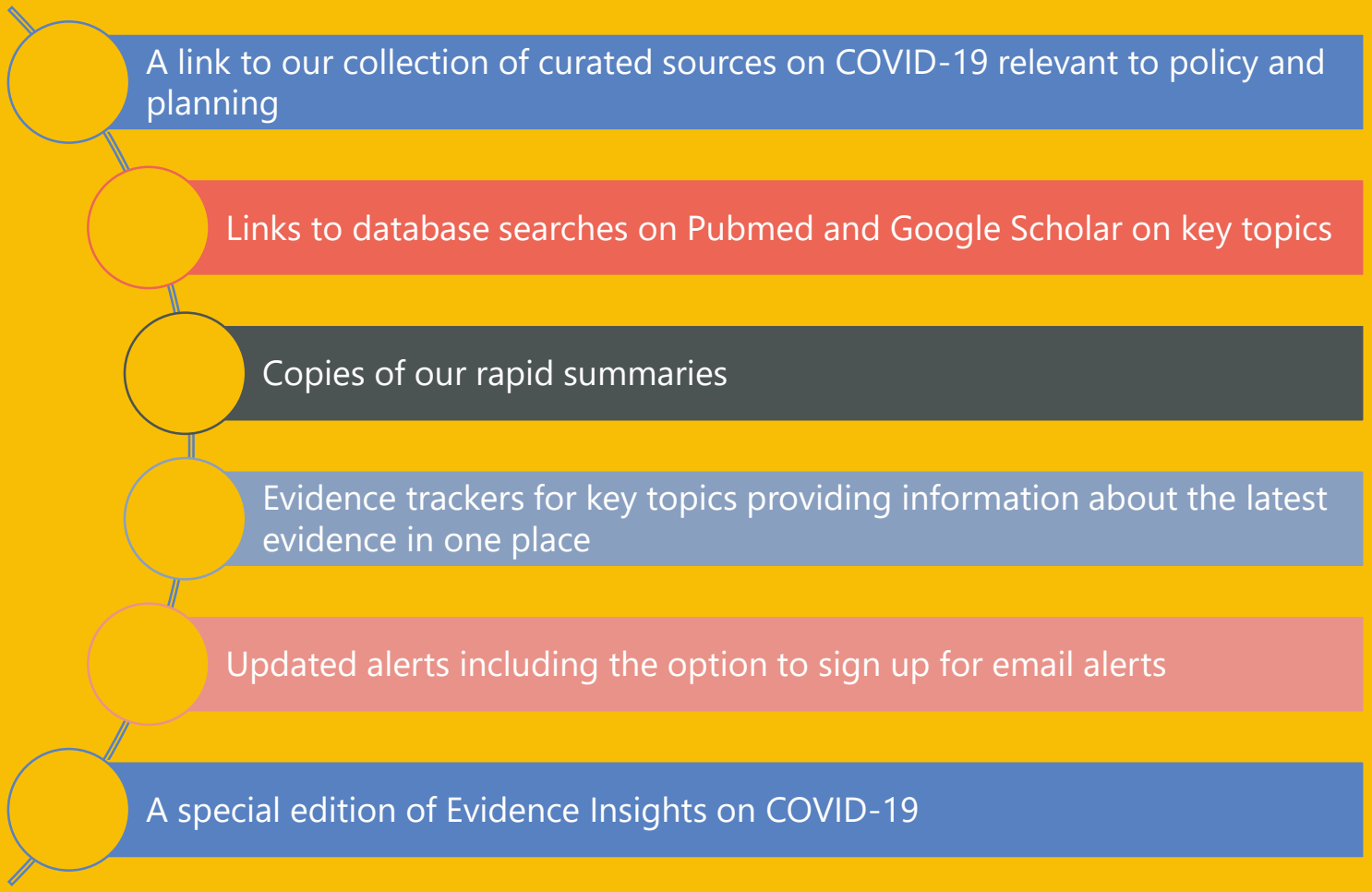
Other useful resources

Title	Country	Link
COVID-19 Health System Response Monitor	Europe	https://www.covid19healthsystem.org/mainpage.aspx [32]
Covid-19, social isolation and loneliness	UK	https://www.iriss.org.uk/resources/esss-outlines/covid-19-social-isolation-and-loneliness[33]
When to Release the Lockdown? A Wellbeing Framework for Analysing Costs and Benefits (Leibniz Information Centre for Economics)	Europe	https://www.econstor.eu/bitstream/10419/216498/1/dp13186.pdf [34]

Keep up to date

Keep up with new and emerging evidence via our web page:
https://www.strategyunitwm.nhs.uk/COVID-19-and-coronavirus

Here you will find:



Links

1. https://www.who.int/publications-detail/immunity-passports-in-the-context-of-covid-19
2. http://www.euro.who.int/__data/assets/pdf_file/0018/440037/Strength-AdjustingMeasuresCOVID19-transition-phases.pdf?ua=1
3. https://www.instituteforgovernment.org.uk/publications/lifting-lockdown-coronavirus-exit-strategy
4. https://www.kcl.ac.uk/policy-institute/assets/coronavirus-in-the-uk.pdf
5. http://ijms.sums.ac.ir/article_46525_f5e85df9512bd5ad85de4ff92b6af154.pdf
6. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD013574/full
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11. https://science.sciencemag.org/content/early/2020/04/24/science.abb5793
12. https://www.cdc.gov/mmwr/volumes/69/wr/mm6911e1.htm?s_cid=mm6911e1_w
13. https://www.medrxiv.org/content/10.1101/2020.04.13.20063933v1
14. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3572141
15. https://academic.oup.com/jid/article/202/6/867/936219
16. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3323345

Links

17. https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-13-211
18. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD013574/full
19. https://www.sciencedirect.com/science/article/pii/S0196655304006030
20. https://jamanetwork.com/journals/jama/fullarticle/208354
21. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2870884/
22. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0180545
23. https://www.nejm.org/doi/10.1056/NEJMoa032111
24. https://wwwnc.cdc.gov/eid/article/19/2/12-0312_article
25. https://link.springer.com/article/10.1007/BF03404439
26. https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-9-470
27. http://www.pnas.org/content/114/15/4023.abstract
28. https://www.nature.com/articles/s41591-020-0871-y.pdf
29. https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(20)30072-4/fulltext?dgcid=raven_jbs_etoc_email
30. https://www.kcl.ac.uk/policy-institute/assets/coronavirus-in-the-uk.pdf
31. https://www.ucl.ac.uk/news/2020/mar/new-study-psychological-and-social-effects-covid-19
32. https://www.covid19healthsystem.org/mainpage.aspx
33. https://www.iriss.org.uk/sites/default/files/2020-04/iriss_esss_outline_social_isolation_22042020.pdf Covid-19
34. https://www.econstor.eu/bitstream/10419/216498/1/dp13186.pdf
35. https://wakelet.com/@Covid19Collaboration

Appendix - Methodology

Scoping the review

Geography	International
Settings	All care settings – secondary, primary, community, independent – unless specified
Language/s	No language restrictions but please note there is no budget for translation. Therefore, we will prioritise translated materials where available and will source translations within existing resource.
Dates	We may limit evidence relating to earlier pandemics/major incidents to the last 10 years, should the volume of results be high, to focus on contemporary literature.

Search sources and locations

Bibliographic databases:

- Pubmed
- Google Scholar
- Cochrane Library
- CINAHL
- Global Health
- Disaster Lit

Aggregators and search engines:

- NHS Evidence
- TRIP (using Covid filters)

Grey literature:

via our curated collection of resources on COVID-19 and Coronavirus [35]