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## COVID-19: endgames

As of April 14, 2020, coronavirus disease 2019 (COVID-19) has killed more than 120 000 people and led to nearly 2 million confirmed infections worldwide. At least a third of the global population is in some form of lockdown, treading the fine line between health services overwhelmed with rapidly rising infections and an economic recession with its own detrimental health consequences. Although this surreal situation might seem like a plot from the Avengers franchise, the hard reality is that the selfless actions of health-care workers will not alone restore the world to normality. Ending the COVID-19 pandemic will take many more months, if not years, so it is time to revisit what we know and make some difficult choices about mitigating subsequent infection waves.

COVID-19 is here to stay, at least until safe and efficacious vaccines become available. Immunisation must be rolled out across the globe to limit the extent of resurgences of infection and to allow us to even entertain the idea of eradication. Presently, one vaccine candidate is in a phase 2 trial, four in phase 1 trials, and 56 in preclinical studies, but the earliest any might be available is September. The key reason for the lockdowns is to allow health-care systems to cope with a spike of severe cases. However, many systems in high-income countries are still under-resourced. For example, only on April 10 did the UK Government publish a plan on managing personal protective equipment (PPE). The first short-term management measure should be to massively increase production and supply of essentials such as appropriate, WHO-approved PPE and dwindling intensive-care drugs. The longer we delay supply, the longer intensive-care units will remain overwhelmed, patients with life-threatening, non-COVID-19 conditions without adequate treatment, and people sliding into poverty because of the economic impact of stringent lockdowns. While these shortages are addressed, emergency measures such as sterilising single-use respirator masks with H<sub>2</sub>O<sub>2</sub> could be considered. Additionally, some health-care settings are scaling up their use of telemedicine to minimise non-essential physician-to-patient contact. Such measures need to be expedited while permanent increases in health-care capacities are developed.

The second urgent measure is widespread testing in all affected countries, first through antigen and RT-PCR tests for active or convalescing infections and then through

IgG and IgM testing for an improved picture of the actual number of past infections. This knowledge will be crucial to inform a more accurate global infection-fatality rate that will then guide governmental decisions on the features, scale, and duration of lockdowns.

Two important questions, besides which tests are the most reliable, are who should be tested and who should be financially responsible for implementing testing. Considering the confusion about the true scale of asymptomatic infections and the advanced stage of the first wave, testing based on contact-tracing is no longer feasible as a standalone approach. A complementary random, cross-sectional testing scenario where one in three to four people get tested every 14 days for both active infection and antibodies could be considered. This approach would fill gaps in contact-tracing and would allow people with confirmed immunity to return to work, easing pressures on government welfare schemes. Also to this end, the responsibility for testing could be shared between governments and private companies that have not been affected by compulsory shut-downs.

Finally, although a triage of key versus non-key workers for movement during lockdowns already exists, it could be extended to include low-risk age groups living in low-risk households. Those people could be allowed to return to the economy while maintaining a degree of social distancing to protect those most vulnerable to severe disease and key workers (who might be at comparatively higher risk but have been required to continue working). Thus, herd immunity through naturally acquired infection might increase until vaccination programmes can start.

Of course, there is no one-size-fits-all strategy. In low-income and middle-income countries (LMICs) with weak health-care systems, dense populations, and poor compliance with hygiene practices, vaccination should be prioritised as soon as it becomes available. Extremely rapid, sample-in-answer-out tests would be paramount as lockdowns in such settings are not feasible because most people rely on daily earnings. The COVID-19 situation in LMICs is discussed in *The Lancet Global Health* May 2020 Editorial. To longitudinally manage this pandemic, we must share lessons from diverse experiences and creatively apply them to our home settings, while strengthening international collaboration. ■ *The Lancet Infectious Diseases*



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For up-to-date COVID-19 case counts see <https://coronavirus.jhu.edu/map.html>

For a current list of vaccine candidates see [https://vaccineshinyapps.io/ncov\\_vaccine\\_landscape/](https://vaccineshinyapps.io/ncov_vaccine_landscape/)

For more on the University of Oxford's vaccine candidate see <https://www.independent.co.uk/news/uk/home-news/coronavirus-vaccine-september-oxford-professor-sarah-gilbert-trials-a9460481.html>

For the UK Government's PPE plan see <https://www.gov.uk/government/publications/coronavirus-covid-19-personal-protective-equipment-ppe-plan>

For news on the UK's availability of intensive-care drugs see <https://www.bbc.co.uk/news/health-52150861>

For the Infectious Diseases Society of America's expert COVID-19 podcast see <https://open.spotify.com/episode/3Y5U901TJwvTt2Lf6Dgbd>

For the May 2020 Editorial by *The Lancet Global Health* see *Lancet Glob Health* 2020; 8: e612