

Ethical issues in managing the COVID-19 pandemic

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Abstract

The COVID-19 pandemic has had an immense and worldwide impact. In light of future pandemics or subsequent waves of COVID-19 it is crucial to focus on the ethical issues that were and still are raised in this COVID-19 crisis. In this paper, we look at issues that are raised in the testing and tracing of patients with COVID-19. We do this by highlighting and expanding on an approach suggested by Fineberg that could serve as a public health approach. In this way, we highlight several ethical issues. As regards testing, questions are raised such as whether it is ethical to use less reliable tests in order to increase testing capacity or minimize harm for patients. Another issue is how wide testing should be and whether selective testing is in accordance with principles of social justice. Patients who have recovered from COVID-19 might have some degree of immunity but attributing certain 'immunoprivileges' raises ethical questions. The use of various tracing methodologies (mobile apps or databases and trained tracers) raised evident questions of social justice and privacy. We argue why it is key to always uphold a test of proportionality where a fair balance must be sought.

KEYWORDS

allocation of scarce goods, contact tracing, COVID-19, proportionality, SARS-CoV-2

1 | INTRODUCTION

There is no doubt that the SARS-CoV-2 virus and the COVID-19 disease can be considered a global threat. Although the case-fatality¹ and mortality² of the virus is reported to be lower than viruses such as SARS or MERS, the SARS-CoV-2 virus is highly infectious and, importantly, most infectious around only 5 days after being

infected.³ There is thus a great extent of presymptomatic (and even asymptomatic) spreading of infection.⁴ Coupled with the fact that, being a new virus, there has been no opportunity to acquire herd immunity, the consequences of the virus far exceed that of SARS, MERS and the seasonal flu. As it stands today, more than 47 million people have been reported to be infected with SARS-CoV-2 of whom about 1.2 million have deceased. By no means is this the end

¹Onder, G., Rezza, G., & Brusaferro, S. (2020). Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA*, 323(18), 1775–1776; Chang, P.-C., Yang, C.-C., Kao, K.-C., & Wen, M.-S. (2020). Clinical outcomes of patients hospitalized for COVID-19 versus SARS: A meta-analysis. *Aging*, 12(24), 24552–24569. <https://doi.org/10.18632/aging.104139>

²Arentz, M., Yim, E., Klaff, L., Lokhandwala, S., Riedo, F. X., Chong, M., & Lee, M. (2020). Characteristics and outcomes of 21 critically ill patients with COVID-19 in Washington State. *JAMA*, 323(16), 1612–1614.

³Pan, Y., Zhang, D., Yang, P., Poon, L. L. M., & Wang, Q. (2020). Viral load of SARS-CoV-2 in clinical samples. *The Lancet Infectious Diseases*, 20(4), 411–412.

⁴Althouse, B. M., Wenger, E. A., Miller, J. C., Scarpino, S. V., Allard, A., Hébert-Dufresne, L., & Hu, H. (2020). Superspreading events in the transmission dynamics of SARS-CoV-2: Opportunities for interventions and control. *PLoS Biology*, 18(11), e3000897. <https://doi.org/10.1371/journal.pbio.3000897> and also Bai, Y., Yao, L., Wei, T., Tian, F., Jin, D.-Y., Chen, L., & Wang, M. (2020). Presumed asymptomatic carrier transmission of COVID-19. *JAMA*, 323(14), 1406–1407. <https://doi.org/10.1001/jama.2020.2565>

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as the pandemic is still growing stronger with many countries now facing a second, and for some countries more severe, wave of SARS-CoV-2 infections and hospitalizations.

Although there is increasing knowledge concerning the epidemiological characteristics of the virus, adequately managing this virus is still proving to be highly challenging and various countries have opted for different approaches and using different timelines.⁵ An element that is key in all strategies to tackle the virus is testing and gaining insight into the spreading of the virus within a country. As remarked by the WHO Director-General Tedros Adhanom in March 2020: 'you cannot fight a fire blindfolded'.⁶ However, when it comes to testing and monitoring, various ethical issues are also raised.

2 | DISTINGUISHING FIVE CATEGORIES

In an editorial of the *New England Journal of Medicine*, Harvey Fineberg suggested an approach to the SARS-CoV-2 pandemic that revolved around differentiating the population into one of five categories and treating them accordingly.⁷ These five categories are:

1. Persons not known to have been exposed to or infected with SARS-CoV-2.
2. Persons known to have been exposed to the virus.
3. Persons suspected to be infected.
4. Persons known to be infected.
5. Persons who are known to have recovered from COVID-19 and are adequately immune.

We believe this is an intriguing distinction that can be expanded on to provide a way to highlight some of the moral issues involved in testing for and monitoring of SARS-CoV-2. We will therefore first expand on the Fineberg suggestion and discuss some of the potential strengths and weaknesses of taking such an approach.

2.1 | Expanding the approach

The central idea of the approach would be that by default people are categorized as 'not known to have been exposed to or infected with COVID-19' (category 1). Based on several criteria they can subsequently be reclassified into a higher category. Through an epidemiological link (e.g. laboratory exposure, close contact with a confirmed COVID-19 case or being a member of risk cohort) a person can be classified into 'known to have been exposed' (category 2). Such an exposure combined with the presence of certain COVID-like symptoms, clinical criteria (e.g. CT confirmed ground glass opacities) or

supportive laboratory evidence (e.g. a positive rapid antigen test) could lead to a categorization as 'suspected to be infected' (category 3). A validated positive PCR test could mean a classification in category 4 (confirmed case). People can of course meet criteria for several categories, as people who have been COVID-19 confirmed, must also have had an exposure. To deal with this issue, we suggest arranging the categories provided by Fineberg in a different, more hierarchical order, so that only the highest category should be applied. People in categories 2 and 3 could then also be reclassified in a lower category, for example following a quarantine or one or more negative PCR tests.

Two things should be noted. The first is that the approach does not include a category 'known not to be exposed and infected with SARS-CoV-2', a category one could reserve for patients with a negative validated PCR test. However, we have chosen not to include this category. For one, while it is possible to get rapid results (a couple of hours) there more often is a delay between the time when the specimens are gathered and when the results of the PCR test are in. This means that in case of a negative RT-PCR test, infection could have occurred in that in-between period. Also, there have been reports of transmission of SARS-CoV-2 by patients with negative RT-PCR tests⁸ as the likelihood of finding viral RNA is thought to be dependent on, among others, the timing of sample collection and the type and quality of the specimen gathered.⁹ Most importantly perhaps is that normally people would only be part of such a category for a brief amount of time (except in very specific circumstances such as perfect self-isolation) so that the general usefulness of such a category would be highly limited.

The second element that needs to be noted is that the final category suggested by Fineberg involves people who have recovered from COVID-19 and are adequately immune. With the possibility of COVID-19 vaccines hitting the market soon and being as efficacious as they are reported to be, this category might have to be changed to simply those who have acquired adequate immunity, be it via having recovered from COVID-19 or via being vaccinated. As we will discuss below, however, even with vaccines the question of immunity from asymptomatic infection is a topic of debate.

2.2 | Strengths and weaknesses

First, it should be remarked that this approach works on the basis of 'viral infection' rather than 'infectiousness'. We acknowledge that when it comes to surveillance and suppressing the epidemic a focus

⁵Cohen, J. (2020). Mass testing, school closings, lockdowns: Countries pick tactics in 'war' against coronavirus. *Science*. <https://doi.org/10.1126/science.abb7733>

⁶Wahab, K. A. (2020). 'You cannot fight a fire blindfolded': WHO chief blasts slow virus testing response. *UN News*. <https://news.un.org/en/story/2020/03/1059552>

⁷Fineberg, H. V. (2020). Ten weeks to crush the curve. *New England Journal of Medicine*, 382(17), e37.

⁸Valent, F., Doimo, A., Mazzilis, G., & Pipan, C. (2020). RT-PCR tests for SARS-CoV-2 processed at a large Italian hospital and false-negative results among confirmed COVID-19 cases. *Infection Control & Hospital Epidemiology*, 1–2. <https://doi.org/10.1017/ice.2020.290>. See also Cao, G., Tang, S., Yang, D., Shi, W., Wang, X., Wang, H., Li, C., Wei, J., & Ma, L. (2020). The potential transmission of SARS-CoV-2 from patients with negative RT-PCR swab tests to others: Two related clusters of COVID-19 outbreak. *Japanese Journal of Infectious Diseases*, 73(6), 399–403. <https://doi.org/10.7883/yoken.JJID.2020.165>

⁹Binnicker, M. J. (2020). Challenges and controversies to testing for COVID-19. *Journal of Clinical Microbiology*, 58(11), e01695–20. <https://doi.org/10.1128/JCM.01695-20>

on infectiousness could be relevant. PCR tests, seen as the goals standard, can detect viral RNA when a patient's viral load is lower, which means the test can give a positive result when a person is no longer infectious.¹⁰ In such a case although a person has a positive PCR test (category 4), quarantine is actually unnecessary and people are harmed for no reason. However, we need to take into account that infection can be assessed more easily than infectiousness. A recent systematic review and meta-analysis showed how a 'comprehensive understanding of viral load dynamics [and] length of viral shedding ... is lacking'.¹¹ In the absence of such understanding, the model will focus on infection, although a continued awareness that this does not overlap with infectiousness remains key.

Second, it is clear that the approach only provides a rough general framework that needs to be adapted to particular contexts. Each of the categories, to start with, still needs specific criteria to determine which cases fall in which category. For example, there can be disagreements over which criteria need to be met to classify a certain encounter as an exposure. In Belgium, for example, a 'high-risk contact' is determined as any face-to-face contact with a confirmed COVID-19 patient for more than 15 min at a distance of less than 1.5 metres regardless of whether mouth masks were worn. Of course, a slightly different set of criteria could also be justified. The US Centres for Disease Control and Prevention (CDC) likewise uses a criterion of less than 6 feet for a period of 15 min or more, but they admit that: 'Data are insufficient to precisely define the duration of exposure that constitutes prolonged exposure and thus a close contact'.¹² The same goes for the distinction between 'suspected' and 'confirmed' cases where different criteria can be brought forward. However, the fact that discussion is possible does not discredit the approach. The point stands that the more accurately we can allocate patients to one of these categories, the more adequately we can respond to the virus and the better we can tailor our policies. This is in essence a concern of social justice, which requires that like cases are treated alike and different cases are treated differently. Many of the early policies, such as lockdowns, have affected everyone in the same way, but the more we learn about the virus the less such a broad and overall approach may be justified.

A potential weakness is of course the practical issue that applying an approach revolving around testing naturally requires considerable testing capacity within a country. The gold standard for diagnosing COVID-19 is the PCR test, but these tests require considerable resources so capacity for such tests may be limited. It has, for example, been argued several times that a country such as South Korea has

successfully controlled the outbreak of the epidemic through broad PCR testing of the population.¹³ However, even Korea has only performed 3.1 million PCR tests. For a population of about 58 million people this amounts, at best, to 5.6% of people being tested in the ideal and near impossible scenario that no person was tested more than once.¹⁴ Thus an approach intent on testing as much as possible could run into scarcity at some point. Thus a policy directed at testing will have to make decisions with ethical implications such as how to best allocate the scarce resource of PCR tests or whether it is justified to use a less specific test with all the risks associated with such tests.

The purpose of such a classification is to provide crucial insight into the epidemiology of the pandemic in a certain country and to help tailor policy. This global pandemic has led countries to take very far-reaching measures many of which, such as a lockdown, have impacted on everyone (although not on everyone equally). However, in taking such drastic measures, even in the face of a potential medical disaster, ethical and societal questions of proportionality and moral rights should also take the forefront. In this paper, we will go into a few general ethical issues first and, subsequently, to more specific issues relating to each of the different categories. What we see when looking at the issues is that many issues arise from a conflict between a clinical ethical and a public health ethical perspective.

3 | SPECIFIC ETHICAL ISSUES RELATING TO EACH OF THE CATEGORIES

3.1 | Patients not known to have been exposed to or infected with COVID-19

There may exist a climate of fear among the general public and health care professionals¹⁵ where SARS-CoV-2 proves to be a fierce but invisible enemy. Nevertheless it seems crucial to us, from an ethical point of view, that people are not automatically treated as suspected COVID-19 cases, but are, by default, treated as people who are not known to have been exposed or infected. They remain so, unless they have contact with patients known to be infected (they become category 2), are suspected to be infected (they become category 3) or receive a positive PCR test (they become category 4). This is crucial since despite there being considerable focus on COVID-19 it is evident that there are still many non-COVID-19 patients in need of medical care. Even in a pandemic crisis, basic rights to health care should still be preserved to a maximal extent.¹⁶

¹⁰Mina, M. J., Parker, R., & Larremore, D. B. (2020). Rethinking Covid-19 test sensitivity – A strategy for containment. *New England Journal of Medicine*, 383(22), e120. <https://doi.org/10.1056/NEJMp2025631>

¹¹Cevik, M., Tate, M., Lloyd, O., Maraolo, A. E., Schafers, J., & Ho, A. (2020). SARS-CoV-2, SARS-CoV, and MERS-CoV viral load dynamics, duration of viral shedding, and infectiousness: A systematic review and meta-analysis. *The Lancet Microbe*, 2(1), E13–E22. [https://doi.org/10.1016/S2666-5247\(20\)30172-5](https://doi.org/10.1016/S2666-5247(20)30172-5)

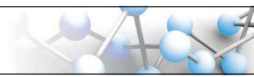
¹²Centers for Disease Control and Prevention. (2020). Coronavirus disease 2019 (COVID-19) 2020 interim case definition. <https://wwwn.cdc.gov/nndss/conditions/coronavirus-disease-2019-covid-19/case-definition/2020/08/05/>

¹³Normile, D. (2020). Coronavirus cases have dropped sharply in South Korea. What's the secret to its success? *Science*. <https://doi.org/10.1126/science.abb7566>

¹⁴Live numbers can be checked at Korean Central Disaster Management Headquarters available at <http://ncov.mohw.go.kr/en/>

¹⁵Klompas, M., Morris, C. A., Sinclair, J., Pearson, M., & Shenoy, E. S. (2021). Universal masking in hospitals in the Covid-19 era. *New England Journal of Medicine*, 382(21), e63. <https://doi.org/10.1056/NEJMp2006372>

¹⁶Baker, T., Schell, C. O., Petersen, D. B., Sawe, H., Khalid, K., Mndolo, S., Rylance, J., McAuley, D. F., Roy, N., Marshall, J., Wallis, L., & Molyneux, E. (2020). Essential care of critical illness must not be forgotten in the COVID-19 pandemic. *The Lancet*, 395(10232), 1253–1254.



The existence of a crisis situation in general does not negate a physician's, a health care institution's or a government's duty to preserve basic rights to health care.¹⁷ One study showed a small series of 12 paediatric patients who had delayed access to health care in Italy where the parents indicated not coming to the hospital because of fear of acquiring COVID-19. This indicates that it remains relevant to provide safe non-COVID care and to send this message to the general population.¹⁸ A recent commentary referred to this effect on non-COVID-19 patients as the 'untold toll'.¹⁹ A recent modelling study calculated more than 6,000 cases of excess deaths in cancer patients in the UK and more than 30,000 in the US due to COVID-19.²⁰ The SARS-CoV-2 virus has had far-reaching effects on how health care is provided, for example in oncology where maintenance therapy is sometimes reduced because this requires an office visit. Other consequences are the large number of potentially therapeutic clinical trials that have all been shut down.

3.2 | People known to have been exposed to the virus

In order to fully chart the spread of the virus within a certain population, it is necessary to also identify the people who have been exposed to the virus. Various methods of tracing and monitoring have been proposed and implemented worldwide. Most countries have a system of contact tracers that track the close contacts of confirmed COVID-19 cases who are then notified and required to go into home-quarantine. Taiwan, which was very quick to introduce such a system of tracing, has been lauded as an example of good practice.²¹ An alternative and complementary approach is via the use of mobile tracing apps through which people who have had close contact with a COVID-19 case receive a digital notification.

There seem to be ethical sensitivities related to contact tracing both in the short term (the current COVID-19 pandemic) and the longer (post-pandemic) term. In the short term, the issue of data protection and privacy is clearly raised, in particular with classic contact

tracing. For example, although Taiwan was praised in its rapid response, less than a month after the virus breakout the Taiwanese government announced that all hospitals, clinics and pharmacies would have access to patients' travel histories.²² In Belgium, which has also started contact tracing through trained tracers, the issue has already been raised that such tracing might be to some extent in violation of the legally enshrined duty of medical professional secrecy.²³ In this debate there arises a conflict between the clinical ethical framework (emphasizing medical secrecy and the patient-physician relationship) and the public health ethical framework (where the provision of certain sensitive medical information by some individuals could be deemed proportional to the general population goal of minimizing either infection, hospitalization or deaths).

The same could be said of COVID-19 tracing apps, which are increasingly being put forward as an important complement to classic contact tracing that could help alleviate data privacy concerns.²⁴ In general three main protocols have been developed, two of which are decentralized, which means contact logs are never sent to a central server (but at all times remain stored on users' phones). Most European countries with an app use one of these two decentralized protocols as they are better at protecting users' data and privacy. However, the downside of such attention to individual privacy from a public health perspective is that because the information is at no point stored on a centralized server, there is little oversight into the workings of the app. As such, a tracing app would help warn individuals when they have had close contact with a confirmed COVID-19 case, but would not provide government institutions with any means to know who or even how many people have been exposed to the virus. There is also no way of checking whether those who receive a notification of a close contact do actually self-quarantine. France, as one of only a handful countries, has therefore opted for a digital tracing app based on a centralized protocol where some data (Bluetooth IDs but no geolocation) are centrally stored. This trades off some privacy concerns (as anonymous centrally stored data are at a higher risk of being deanonymized) with the possibility of the government receiving valuable epidemiological population-size information. The issue here is that the uptake of the app in France is very low²⁵ and so the usefulness of the app as a surveillance and monitoring tool is limited.

It could be argued that despite privacy concerns, an approach that would involve the government to obtain some relevant information could be justified from a public health ethical approach in view of the importance of charting how many people have been exposed to the virus. Importantly, also taking into account such a public health ethical perspective would not mean that just about

¹⁷Berlinger, N., Wynia, M., Powell, T., Hester, D. M., Milliken, A., Fabi, R., Cohn, F., Guidry-Grimes, L. K., Carlin Watson, J., Bruce, L., Chuang, E. J., Oei, G., Abbott, J., & Piper Jenks, N. (2020). *Ethical framework for health care institutions & guidelines for institutional ethics services responding to the coronavirus pandemic*. The Hastings Center. <https://www.thehastingscenter.org/wp-content/uploads/HastingsCenterCovidFramework2020.pdf>

¹⁸Lazzerini, M., Barbi, E., Apicella, A., Marchetti, F., Cardinale, F., & Trobia, G. (2020). Delayed access or provision of care in Italy resulting from fear of COVID-19. *The Lancet Child & Adolescent Health*, 4(5), e10–e11.

¹⁹Rosenbaum, L. (2020). The untold toll – The pandemic's effects on patients without Covid-19. *New England Journal of Medicine*, 382(24), 2368–2371. <https://doi.org/10.1056/nejms2009984>

²⁰Lai, A. G., Pasea, L., Banerjee, A., Denaxas, S., Katsoulis, M., Chang, W. H., Williams, B., Pillay, D., Noursadeghi, M., Linch, D., Hughes, D., Forster, M. D., Turnbull, C., Fitzpatrick, N. K., Boyd, K., Foster, G. R., Cooper, M., Jones, M., Pritchard-Jones, K., ... Hemingway, H. (2020). Estimating excess mortality in people with cancer and multimorbidity in the COVID-19 emergency (preprint). *Oncology*. <https://doi.org/10.1101/2020.05.27.20083287>

²¹Steinbrook, R. (2020). Contact tracing, testing, and control of COVID-19—learning from Taiwan. *JAMA Internal Medicine*, 180(9), 1163. <https://doi.org/10.1001/jamainternmed.2020.2072>

²²Wang, C. J., Ng, C. Y., & Brook, R. H. (2020). Response to COVID-19 in Taiwan: Big data analytics, new technology, and proactive testing. *JAMA*, 323(14), 1341–1342.

²³Goffin, T. (2020, May 13). Contact tracing Covid-19 dwingt artsen tot schending van het beroepsgeheim. *DeJuristenkrant*, 22(409), 7.

²⁴Abeler, J., Bäcker, M., Buermeyer, U., & Zillesen, H. (2020). COVID-19 contact tracing and data protection can go together. *JMIRMHHealth and UHealth*, 8(4), e19359.

²⁵Blasimme, A., & Vayena, E. (2020). What's next for COVID-19 apps? Governance and oversight. *Science*, 370(6518), 760–762. <https://doi.org/10.1126/science.abd9006>

everything goes. It has been forcefully argued that even from this perspective the app should still be 'necessary, proportional, scientifically valid and time-bound'.²⁶ However, by applying these conditions an app that uses a more centralized system could also be ethically justified. We believe there can be a compromise between protecting privacy (all data are anonymous and no geolocation is stored) and providing governments some epidemiological insights.

Of course these apps also face issues and are unlikely to be a panacea. For one, for their success such apps rely on people's willingness to install and use the app. This willingness might not be high as the uptake of the app in such countries as Australia, Italy, Switzerland and Germany, for example, never exceeds 26%.²⁷ With such low uptake, the tracing app might not be very effective and provide a false sense of security to those using the app. A contact tracing app should also be accessible to all, which might be an issue in practice. An app such as the Belgian Coronalert app only operates on Android version 6 or higher, or iOS version 13.5 or higher and does not work on Huawei phones.²⁸ Those without (recent) smartphones could thus not benefit from the app, which could increase inequality in the general population. As such, tracing apps should also be assessed on their *fairness*, which is currently difficult as most countries have little to no insight into the apps' workings. The app should also be scientifically valid, which will need to be examined as 'proximity' is measured via exchange of Bluetooth IDs, which might not adequately reflect the risk of the exposure. People might be wearing masks or might even be separated by a wall or plastic screen, for example, and yet be logged as 'close contacts'.

We should of course look at the impact of contact tracing in the long run. Some authors have argued that there might be a risk that this pandemic and the focus on contact tracing could lead us to look differently at our freedoms in the long run. For one, we might be more willing or accustomed to providing our contact details where we go. More dramatically, it is claimed, there might be a temptation to incorporate such mass surveillance into ordinary laws, thus potentially undermining human rights.²⁹ As we have argued in this section, however, current tracing apps based on a decentralized protocol (which most countries use) share very little information, at the cost of not providing governmental institutions with potentially relevant surveillance information.

3.3 | Patients suspected to be infected

Thirdly, there is the category of those people who are suspected to be infected. Our suggested approach focuses on testing, more specifically a broad testing approach. A first justification for such an

approach is that there are many cases of undocumented infections³⁰ and even asymptomatic patients with viral loads comparable to symptomatic cases.³¹ As these persons nevertheless spread the virus, adequately identifying them can help slow the viral spread. It might also help track case clustering and prevent super-spreading events.³² Second, a broader testing strategy might be less discriminatory since it may to a lesser extent require the identification of 'high-risk profiles' for transferring the virus.³³

However, like the previous category, ethical issues are raised and they can also be framed as a conflict between a clinical ethical framework on the one hand and a public health ethical framework on the other hand.

One ethical issue is the decision who should be tested and what kinds of tests are warranted in a world where tests are scarce. This category of patients (category 3) are those patients who are suspected to have COVID-19 *but are not known* to have COVID-19. From a clinical perspective it makes sense to confirm (or disconfirm) a diagnosis and thus to test these patients. From a clinical ethical perspective it makes sense to use the test that has the best sensitivity and best specificity as a COVID-19 diagnosis has potentially far-reaching consequences such as isolation and being treated on a COVID-19 ward. Because of these consequences it makes sense to minimize the possibility of error and thus of false positives (who are treated as COVID-19 patients but aren't) or false negatives (who falsely believe they don't have COVID-19 and can infect people around them). The gold standard for COVID-19 diagnosis is the RT-PCR test that is used in many countries.

However, when looking from a more public health ethical perspective, where the health of a population is key, other issues arise. For one, PCR laboratory tests are resource intensive and thus potentially scarce. At the height of a COVID-19 pandemic, testing those who are suspected to have COVID-19 may mean that tests may be lacking for other people. In Belgium, for example, the government was required to adjust its PCR testing strategy due to insufficient testing capacity. It was decided that persons without COVID-19-like symptoms would no longer be tested, although they would still have to self-quarantine if they had a high-risk contact.³⁴ In terms of our approach this would mean that people in categories 1 and 2 would no longer be tested and that those in category 2 (exposed to the virus but no clinical symptoms) would have to self-quarantine. It is becoming more and more clear that a considerable

²⁶Morley, J., Cows, J., Taddeo, M., & Floridi, L. (2020). Ethical guidelines for COVID-19 tracing apps. *Nature*, 582(7810), 29–31. <https://doi.org/10.1038/d41586-020-01578-0>

²⁷Ibid.

²⁸See for example the official website of the Coronalert app that is used in Belgium and can be found <https://coronalert.be/en/faq/>

²⁹Nay, O. (2020). Can a virus undermine human rights? *The Lancet Public Health*, 5(5), e238–e239. [https://doi.org/10.1016/S2468-2667\(20\)30092-X](https://doi.org/10.1016/S2468-2667(20)30092-X)

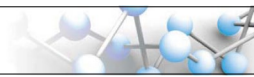
³⁰Li, R., Pei, S., Chen, B., Song, Y., Zhang, T., Yang, W., & Shaman, J. (2020). Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV2). *Science*, 368(6490), 489–493.

³¹Bai et al., op. cit. note 4.

³²Kupferschmidt, K. (2020). Case clustering emerges as key pandemic puzzle. *Science*, 368(6493), 808–809.

³³Studdert, D. M., & Hall, M. A. (2020). Disease control, civil liberties, and mass testing – Calibrating restrictions during the Covid-19 pandemic. *New England Journal of Medicine*, 383(2), 102–104. <https://doi.org/10.1056/nejmp2007637>

³⁴See for example Chini, M. (2020). Belgium will stop testing people without Covid-19 symptoms. *The Brussels Times*. Epub. <https://www.brusselstimes.com/news/belgium-all-news/136602/belgium-will-stop-testing-people-without-covid-19-symptoms-quarantine-10-day-red-zone-travel/>



amount of SARS-CoV-2 infection may be asymptomatic, with a recent narrative review suggesting it might be up to 40%. For this reason, the authors remark that: 'If asymptomatic transmission is indeed common, testing only those with symptoms would seem to be folly' (p. 365).³⁵

A second issue is that, as suggested in a *New England Journal of Medicine* commentary, the standard PCR test might need to be rethought in some cases. The authors claim:

By several criteria, the benchmark standard clinical polymerase chain-reaction (PCR) test fails when used in a surveillance regimen. After collection, PCR samples typically require transport to a centralized lab staffed by experts, which drives up costs, drives down frequency, and can delay results by one or more days.³⁶

From a clinical diagnostic perspective, tests are applied in a specific case and need to give a reliable result but there is not necessarily a need for tests to be low cost. From a public health perspective, there is a need for broad testing and so we may need tests that are low cost, can be performed several times and give results more quickly, even at the cost of some sensitivity and specificity. Slovakia, in November, did test almost its entire adult population for COVID-19, but they did so using a less resource intensive rapid antigen test.³⁷ This approach was also critiqued precisely because of the lower specificity and sensitivity of the antigen test (compared with PCR) and the possibility that people might actually get infected at mass testing sites. Although such concerns are valid from a clinical perspective, they do need to be balanced against the potential benefits from a surveillance and policy perspective.

The PCR is also so sensitive that it can detect viral RNA before or after patients have become infectious. That means people might be unnecessarily quarantined. A test with lower analytic sensitivity but applied more frequently (potentially problematic from a clinical ethical perspective if a better test is available) could perhaps be lower in general costs and only provide a positive result when patients are actually infectious thus justifying quarantine. To recap, RT-PCR undoubtedly remains the most accurate and reliable tool to diagnose COVID-19. But in view of the rapid spread of the virus, a choice might have to be made to reallocate tests or to use more low cost and less sensitive tests in order to make PCR tests available for those cases where they are key. In view of the large number of asymptomatic SARS-CoV-2 cases, this could involve testing those who have been exposed but exhibit no symptoms in order to track presymptomatic and/or asymptomatic cases.

We do, however, want to highlight an important caveat. Based on small scale studies it has been suggested that seriously ill patients have significantly higher viral loads than those who are moderately ill, making viral load a potential indicator for disease severity.³⁸ If so, then the RT-PCR test might not only have a diagnostic but also an important prognostic value.

3.4 | Patients known to be infected

Most of the issues relating to patients known to be infected (category 4) have been discussed above. Again, we believe it is important to also look at these ethical issues from a public health ethical perspective. It can be ethically justified to rethink the reliance on PCR tests for patients who display symptoms from the perspective of management of scarce resources or economic costs. As such there may be other ways to more quickly (although somewhat less reliably) diagnose COVID-19 and consider a patient to be 'known to be infected'. For example, it has been argued that CT findings could also be used as an early diagnosis tool,³⁹ allowing for an increase in testing capacity. Others have replied that such CT findings (e.g. ground glass opacities) might not be specific enough to COVID-19 and thus not reliable as a diagnostic tool.⁴⁰ However, as also remarked as a reply to Huang et al., a CT scan never happens in isolation.⁴¹ For a patient who has had contact with a known COVID-19 patient and is displaying typical COVID-19 symptoms, a COVID-19 typical CT scan might be counted as sufficient evidence. This would make scarce PCR or other tests available for other patients, which is more interesting from a surveillance perspective.

As with the previous sections, a more public health focused approach does not mean anything goes and basic clinical standards need to be upheld. Some authors have argued for the use of ultrasound,⁴² as this is low-tech, low cost and potentially safer than CT scans. However, although this might provide less risk of infection for both patient and health care worker, it remains to be seen whether this does not result in loss of quality for the patient.

³⁵Oran, D. P., & Topol, E. J. (2020). Prevalence of asymptomatic SARS-CoV-2 infection: A narrative review. *Annals of Internal Medicine*, 173(5), 362–367. <https://doi.org/10.7326/M20-3012>

³⁶Mina et al., op. cit. note 10.

³⁷Holt, E. (2020). Slovakia to test all adults for SARS-CoV-2. *The Lancet*, 396(10260), 1386–1387. [https://doi.org/10.1016/S0140-6736\(20\)32261-3](https://doi.org/10.1016/S0140-6736(20)32261-3)

³⁸Liu, Y., Yan, L. M., Wan, L., Xiang, T. X., Le, A., Liu, J. M., Peiris, M., Poon, L., & Zhang, W. (2020). Viral dynamics in mild and severe cases of COVID-19. *The Lancet Infectious Diseases*, 20(6), 656–657. [https://doi.org/10.1016/S1473-3099\(20\)30232-2](https://doi.org/10.1016/S1473-3099(20)30232-2)

³⁹Shi, H., Han, X., Jiang, N., Cao, Y., Alwalid, O., Gu, J., Fan, Y., & Zheng, C. (2020). Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: A descriptive study. *The Lancet Infectious Diseases*, 20(4), 425–434.

⁴⁰Huang, Y., Cheng, W., Zhao, N., Qu, H., & Tian, J. (2020). CT screening for early diagnosis of SARS-CoV-2 infection. *The Lancet Infectious Diseases*, 20(9), 1010–1011. [https://doi.org/10.1016/S1473-3099\(20\)30241-3](https://doi.org/10.1016/S1473-3099(20)30241-3). See also Hope, M. D., Raptis, C. A., Shah, A., Hammer, M. M., & Henry, T. S. (2020). A role for CT in COVID-19? What data really tell us so far. *The Lancet*, 395(10231), 1189–1190.

⁴¹Shi, H., Han, X., Cao, Y., Alwalid, O., & Zheng, C. (2020). CT screening for early diagnosis of SARS-CoV-2 infection – Authors' reply. *The Lancet Infectious Diseases*, 20(9), 1011. [https://doi.org/10.1016/S1473-3099\(20\)30247-4](https://doi.org/10.1016/S1473-3099(20)30247-4)

⁴²Buonsenso, D., Pata, D., & Chiaretti, A. (2020). COVID-19 outbreak: Less stethoscope, more ultrasound. *The Lancet Respiratory Medicine*, 8(5), e27.

3.5 | Patients who have recovered from COVID-19

A final category is those patients who were (a) confirmed to have COVID-19 and have recovered (measured for example through a repeated negative PCR test); (b) tested positive on a COVID-19 antibody test;⁴³ or (c) received an effective vaccine. Identifying those who have recovered from COVID-19 could also be relevant because there is the possibility that patients with COVID-19 could be treated with convalescent plasma with SARS-CoV-2-specific antibody (IgG) obtained from patients that have recovered from the virus. One study reports five patients on mechanical ventilation being treated with such convalescent plasma transfusion and antiviral medication, all of whom recovered.⁴⁴ Others have joined these authors in recommending convalescent plasma with antibodies as a potential treatment.⁴⁵ More research and robust evidence is thus needed, but if beneficial it is relevant to know which patients have developed the relevant antibodies to SARS-CoV-2. With vaccination that has started in the UK and is likely to start at relatively short notice in other countries, this group is likely to rise.

When it comes to ethical concern, the main concern seems to be that such antibody tests should not lead to discrimination and stigmatization. There have been media reports that countries such as Germany⁴⁶ and the UK⁴⁷ at some point were considering issuing antibody-certificates to those patients who have recovered from COVID-19 and have acquired antibodies. Certifying one's vaccine status is not uncommon, for example in the context of travelling. It is thus not the case that this would introduce a novelty in our system. Moreover, as vaccination for COVID-19 is likely not going to be mandatory in most countries, a benefit such as the possibility of travelling could help nudge people towards getting vaccinated.

There are, however, several ethical issues with registering vaccination status and making certain activities, such as travelling, contingent on immunity status. For one, it might be unclear what is the best immunological correlate for protection and one might use recovery from confirmed infection or vaccination as surrogates. Whether this is justified depends on how accurately these two determine protection. Currently in the UK vaccination has started with the BNT162b2 mRNA COVID-19 vaccine, known as the Pfizer vaccine. For this vaccine phase III results were released that show an efficacy of 95%

based on the incidences of confirmed SARS-CoV-2 infection in the vaccinated and the placebo group. In this study, a confirmed SARS-CoV-2 infection was defined as the presence of a positive PCR test and presence of one or more COVID-19-like symptoms, but no regular antibody or other tests were done to look for asymptomatic infection. As such, the authors confirm that '[t]hese data do not address whether vaccination prevents asymptomatic infection', although they state that a serological end point where previous infection can be traced will be released later.⁴⁸ Such information, however, is relevant if we want to give the vaccinated more freedom as without such knowledge it is impossible to be certain that those who are vaccinated do not still get infected (although asymptotically) and, perhaps, even still spread the virus. A phase 3 trial of the ChAdOx1 nCoV-19 vaccine (known as the Oxford or AstraZeneca vaccine) did test for asymptomatic infection and they report a slightly smaller number of asymptomatic infections in the vaccinated group compared to the placebo group.⁴⁹ This means that it is at least plausible that even among those who are vaccinated there is a significant number of asymptomatic patients⁵⁰ (although it is still unknown to what extent these are also infectious).

Apart from scientific considerations, there are also ethical concerns when populations are divided into those deemed safe and those who are not.⁵¹ Such 'immunoprivilege' has been argued to have a dark history.⁵² There are also issues of social justice and fairness. First, providing antibody certificates might harm those people who due to their carefulness have not contracted the illness and/or do not have the opportunity to be vaccinated. Second, it is important to bear in mind that the pandemic does not affect all people in a uniform way.⁵³ There have, to give one example, been argued to be racial health disparities relating to COVID-19.⁵⁴ We must take care that antibody certificates do not create new unjustified inequalities or worsen existing inequalities.

⁴³Petherick, A. (2020). Developing antibody tests for SARS-CoV-2. *The Lancet*, 395(10230), 1101–1102.

⁴⁴Shen, C., Wang, Z., Zhao, F., Yang, Y., Li, J., Yuan, J., Wang, F., Li, D., Yang, M., Xing, L., Wei, J., Xiao, H., Yang, Y., Qu, J., Qing, L., Chen, L., Xu, Z., Peng, L., Li, Y., ... Liu, L. (2020). Treatment of 5 critically ill patients with COVID-19 with convalescent plasma. *JAMA*, 323(16), 1582–1589.

⁴⁵Chen, L., Xiong, J., Bao, L., & Shi, Y. (2020). Convalescent plasma as a potential therapy for COVID-19. *The Lancet Infectious Diseases*, 20(4), 398–400; and also Roback, J. D., & Guarner, J. (2020). Convalescent plasma to treat COVID-19: Possibilities and challenges. *JAMA*, 323(16), 1561–1562.

⁴⁶Wighton, D., & Chazan, D. (2020). Germany will issue coronavirus antibody certificates to allow quarantined to re-enter society. *The Telegraph*. <https://www.telegraph.co.uk/news/2020/03/29/germany-will-issue-coronavirus-antibody-certificates-allow-quarantined/>

⁴⁷Mason, R., Syal, R., & Sabbagh, D. (2020). No 10 seeks to end coronavirus lockdown with 'immunity passports'. *The Guardian*. <https://www.theguardian.com/politics/2020/apr/02/no-10-seeks-to-end-covid-19-lockdown-with-immunity-passports>

⁴⁸Polack, F. P., Thomas, S. J., Kitchin, N., Absalon, J., Gurtman, A., Lockhart, S., Perez, J. L., Pérez Marc, G., Moreira, E. D., Zerbini, C., Bailey, R., Swanson, K. A., Roychoudhury, S., Koury, K., Li, P., Kalina, W. V., Cooper, D., Frenck, R. W., Hammitt, L. L., ... Gruber, W. C. (2020). Safety and efficacy of the BNT162b2 mRNA Covid-19 vaccine. *New England Journal of Medicine*, 383, 2603–2614. <https://doi.org/10.1056/NEJMoa2034577>

⁴⁹Voysey, M., Clemens, S. A. C., Madhi, S. A., Weckx, L. Y., Folegatti, P. M., Aley, P. K., Angus, B., Baillie, V. L., Barnabas, S. L., Bhorat, Q. E., Bibi, S., Briner, C., Cicconi, P., Collins, A. M., Colin-Jones, R., Cutland, C. L., Darton, T. C., Dheda, K., Duncan, C. J. A., ... Pollard, A. J. (2020). Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: An interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. *The Lancet*, 397(10269), 99–111. [https://doi.org/10.1016/S0140-6736\(20\)32661-1](https://doi.org/10.1016/S0140-6736(20)32661-1)

⁵⁰Mahase, E. (2020). Covid-19: Oxford vaccine could be 59% effective against asymptomatic infections, analysis shows. *BMJ*, 371, m4777. <https://doi.org/10.1136/bmj.m4777>

⁵¹Kofler, N., & Baylis, F. (2020). Ten reasons why immunity passports are a bad idea. *Nature*, 581(7809), 379–381. <https://doi.org/10.1038/d41586-020-01451-0>

⁵²Olivarius, K. (2020, April 12). The dangerous history of immunoprivilege. *The New York Times*. <https://www.nytimes.com/2020/04/12/opinion/coronavirus-immunity-passports.html>

⁵³Ahmed, F., Ahmed, N., Pissarides, C., & Stiglitz, J. (2020). Why inequality could spread COVID-19. *The Lancet Public Health*, 5(5), e240.

⁵⁴Chowkwanyun, M., & Reed, A. L. (2020). Racial health disparities and Covid-19 – wCaution and context. *New England Journal of Medicine*, 383(3), 201–203. <https://doi.org/10.1056/nejmp2012910>

Interestingly, the argument of inequality has in part been used as an argument in favour of granting privileges to those who have proven protection.⁵⁵ When, as we know, certain vulnerable groups have been hit unequally hard by the COVID pandemic, such as elderly patients and socially disadvantaged patients,⁵⁶ allowing them to regain certain freedoms could also be a justified compensation based on a Rawlsian difference principle⁵⁷ that says unequal allocation is justified when this would benefit the least advantaged in a society.

4 | CONCLUDING REMARKS

Responding to the SARS-CoV-2 pandemic is likely to require a broad, integrated and coordinated approach to determine who has contracted the virus, who may have contracted the virus, who has been exposed to the virus and who has recovered from it. We have expanded on a suggestion made by Fineberg that to help combat the pandemic it is important to quickly identify five categories of people. Such an approach could provide policy makers with valuable tools to adequately manage this health crisis and to tailor policies in the most just way.

Subsequently, we have used this approach to highlight several ethical issues that are tied to each of these categories. There is no doubt that we are facing a worldwide crisis, but this does not mean that all people's fundamental rights are automatically forfeited. We have argued that the issues should not be approached solely from a clinical ethical standard, but that a public health ethical approach may also be justified. When it comes to testing, for example, a PCR test is no doubt the most sensitive and specific diagnostic tool, making it most useful from the clinical perspective of diagnosis. However, in a public health crisis one has to consider the most proportional and just way to allocate tests. This may involve using tests that are slightly less sensitive but low cost and more readily available. Likewise, proximity tracking could be part of an effective strategy to contain the virus but may not always trump people's right to privacy, particularly when the information shared is delicate health related information. However, some apps protect privacy in such

a way that no information, under any form, becomes available for governmental institutions even though such information could help inform their policy. A balance between these individual and public health considerations is thus crucial.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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