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Stopping the lockdown and ending the Covid-19 epidemic by universal weekly testing as the exit strategy

Julian Peto, *Nisreen A Alwan, Keith M Godfrey, Rochelle A Burgess, David J Hunter, Elio Riboli, Paul Romer, on behalf of 27 signatories

The longer version sent to the Government on April 10 2020 with the full list of signatories is attached below

***julian.peto@lshtm.ac.uk; n.a.alwan@soton.ac.uk**

The British public are offered alternating periods of lockdown and relaxation of restrictions, with increasing economic and social damage[1]. Each relaxation will almost certainly trigger a further epidemic wave of deaths. These cycles will kill tens and perhaps hundreds of thousands of people before a vaccine becomes available, and the most disadvantaged are already suffering the most.

There is an alternative: universal repeated testing[2]. We recommend evaluation of weekly Covid-19 antigen testing of the whole population in an entire city as a demonstration site (preferably several towns and cities), with strict household quarantine following a positive test. Quarantine ends when all residents test negative at the same time. Everyone else can resume normal life if they choose to. This should be assessed for feasibility in one or more cities with populations of 200,000-300,000. Such a feasibility study should begin as soon as possible and continue after the current lockdown ends, when the infection rate will be fairly low but rising. The rate at which it then rises or falls compared with the rest of the UK will be apparent within a few weeks. A decision can then be taken on national roll-out, beginning in high-risk areas and limited only by reagent supplies. If this works hundreds of thousands of people living in the UK may be saved, not to mention intensive care overload and the miseries of unemployment, mental ill health and other adverse outcomes of lockdown.

A local population of 200,000 with 90% compliance will require 26,000 tests per day, plus a small excess to offer daily antigen testing for NHS staff and care workers. Such a study is likely to have the enthusiastic support of the population. Whatever the results these data will enable policy to be based on real-time evidence (instead of modelling assumptions) on new infection rates in the expanding regularly tested population and the untested remainder. The latter can be monitored by testing population samples as well as by NHS number linkage to hospital diagnoses and GP records. Complementary strategies including contact tracing and phone apps will be critical in the unscreened population, and may enable testing to be done less frequently as prevalence falls. Testing would be voluntary, but penalties for breaching quarantine following a positive test in a household could be considered. Helplines would be provided to support quarantined households with access to income compensation, mental health support and food delivery.

National roll-out will entail mobilisation of community assets. Public advisory groups and citizens supporting these efforts will be indispensable. A voluntary "Dunkirk spirit" is the only way for 10 million tests to be done daily by collaborating university and commercial labs with the necessary quality-checked equipment (a PCR machine). PCR reagents should be obtained from chemical manufacturers rather than clinical test companies and exempt from regulatory requirements on medical testing to limit costs and ensure supplies. This may require emergency legislation.

References

1. Scientific Advisory Group for Emergencies. SPI-M-O: consensus view on behavioural and social interventions. March 16, 2020. https://assets.publishing.service.gov.uk/ government/uploads/system/uploads/ attachment_data/file/873729/06-spi-m-o-consensus-view-on-behavioural-and-social-interventions.pdf (accessed April 17, 2020).
2. Peto J. Covid-19 mass testing facilities could end the epidemic rapidly. *BMJ* 2020; **368:** m1163.

Open letter to UK Government sent April 10 2020

Stopping the lockdown and ending the epidemic by universal weekly testing as the exit strategy

Dear Mr Dominic Raab, Sir Keir Starmer, Mr Jeremy Hunt, Mr Matt Hancock, Mr Jonathan Ashworth, Professors Sir Patrick Vallance, Chris Whitty and John Newton,

The British public have so far been offered the strategy of alternating periods of lockdown and relaxation of restrictions. However, extended periods of lockdown will increase economic and social damage, and periods of relaxation of restrictions are almost certainly going to trigger further epidemic waves of fatalities. We strongly support expanding testing as quickly as possible, building up local public health teams to get our systems in place for case detection and contact tracing. We note however that asymptomatic and pre-symptomatic transmission may be a major factor in the epidemic. The resurgence can be slowed by contact tracing, behavioural changes and various degrees of physical distancing but it cannot be stopped. These cycles will kill tens and perhaps hundreds of thousands of people before a vaccine becomes available, and the most disadvantaged will suffer most.

As experienced public health researchers and practitioners we believe there is an alternative strategy that can restore normal life and economic recovery: universal repeated testing. We strongly recommend evaluation of weekly Covid-19 antigen testing of the whole population in an entire city as a demonstration site (preferably several towns and cities if funding is available), with strict household quarantine following a positive test. Visitors are allowed but are quarantined on arrival. Quarantine ends when all residents test negative at the same time.

Lockdown will end immediately for everyone else, although some may choose to remain isolated. This should be assessed for feasibility in one or more cities with populations of ~200,000. Ending lockdown with weekly testing is likely to suppress viral transmission while restoring normal life. Such a feasibility study could begin immediately with Government support. The study will have begun after lockdown so the initial infection rate will be fairly low. The rate at which it then rises or falls will be apparent within a few weeks. A decision can then be taken on national roll-out, beginning in high-risk areas and limited only by reagent supplies. If this works hundreds of thousands of lives of people living in the UK may be saved, not to mention NHS intensive care overload and the miseries of lockdown and unemployment.

The site(s) should be selected in consultation with local health and administrative authorities. Public awareness and implementation will be organised by a community advisory committee led by local public health specialists and PHE consultants in communicable disease control. To establish the feasibility of national roll-out all tests will be performed by staff in local academic or commercial labs with PCR machines currently used for other purposes. A city of 200,000 with 90% compliance will require 26,000 tests per day, plus a small increase to offer daily antigen testing for NHS staff and care workers. Such a study can be done without encroachments on privacy rights and with the consent of the population. Other requirements for the feasibility study are a population register of the city, self-sample kits and a system for delivering and collecting samples (see below).

Whatever the results these data will enable policy to be based on real-time evidence (instead of modelling assumptions) on new infection rates in the expanding regularly tested population and the untested remainder. The latter can be monitored by testing population samples as well as by NHS number linkage to hospital diagnoses and GP records. Complementary and alternative strategies including contact tracing and mobile phone apps will be particularly important in the unscreened population, and may enable testing to be done less frequently as prevalence falls. Local public health staff supported by volunteers will assist in developing, implementing and evaluating these as well as supporting public information, home visits and helplines. To minimise disruption, access to the city would be unrestricted with occasional testing of incomers at temporary checkpoints. Testing would be voluntary, but imposing penalties for breaching quarantine following a positive test in a household could be considered. Helplines would be provided for quarantined households for exemption requests, loss of income compensation and food delivery.

National roll-out

If the epidemic is controlled without lockdown in the feasibility study, public pressure for national roll-out will be irresistible. A ballpark cost-benefit analysis shows a total cost per year following national roll-out of £14 billion, the most speculative components being £100 million to expand facilities for manufacturing reagents and £2 per test for PCR reagents (£7 billion per year for 10 million tests per day). This is a small fraction of the economic costs of lockdown. Chemical manufacturers rather than clinical test companies must be involved to limit costs and ensure supplies. Quality control can be minimal because PCR is sensitive and any false negatives tend to be the least infectious cases, and because both false negatives and false positives will be retested a week later.

Universal repeat testing has been dismissed as impractical because so many tests are required and because it has never been tried. Each of the imagined obstacles is simply a shortage that can be met, perhaps quite quickly, by (preferably British) manufacturers.

The facilities needed are:
1. A register of names, dates of birth and addresses of all residents registered with a GP, to be updated as necessary with test results, changes of address and addition of unregistered subjects. Anonymous registration with local outlets for sample collection and delivery is needed for those reluctant to give name and address.
2. The equivalent of 14,000 96-well PCR machines running night and day. Enough machines and experienced staff to operate them are already in place in large and small academic and commercial labs throughout the UK, including possible demonstration sites. Posts for three 8-hour shifts might be needed.
3. Self-sample swabs, sample transport tubes individually labelled with name, date of birth and barcoded ID, PCR reagents and microtiter plates for 10 million tests per day. Additional production facilities must be commissioned if necessary.
4. Arrangements to deliver and collect samples from every household once a week, with delivery to a testing lab within a few hours. Results would be entered online by the lab within a day of sample collection. Positive results in those without phone or email would be delivered by courier.

This high throughput would depend on various regulatory emergency waivers:
1. Lab staff would wear PPE where necessary but would not be accredited to conduct medical tests.
2. Laboratories would be advised on precautions but not accredited for handling infectious samples.
3. PCR reagent production with normal non-medical quality control cannot be hampered by patents or regulations on medical test manufacture.

The idea of conducting regular population-wide mass testing, which has never been tried in a large country, is unusual in two respects. First, a voluntary “Dunkirk spirit” collaboration of all university and commercial labs that already have the necessary equipment (a PCR machine) is the only way for 10 million tests to be done daily. Second, manufacture and testing would be arranged in consultation with chemical manufacturers rather than clinical test companies and exempt from regulatory requirements on medical testing. This requires emergency legislation.

Yours sincerely,

Julian Peto, Professor of Epidemiology, London School of Hygiene and Tropical Medicine
Nisreen A Alwan, Associate Professor in Public Health, University of Southampton
Iain Buchan, Professor of Public Health and Clinical Informatics, University of Liverpool
Rochelle A Burgess, Lecturer in Global Health, UCL Institute for Global Health
Tim Colbourn, Associate Professor of Global Health Epidemiology and Evaluation, UCL Institute for Global Health
Céire Costelloe, Senior Lecturer in Medical Statistics, Imperial College London

George Davey Smith, Director of MRC Integrative Epidemiology Unit, University of Bristol
Paul Elliott, Professor of Epidemiology and Public Health Medicine, Imperial College London
Majid Ezzati, Professor of Global Environmental Health, Imperial College London
Ruth Gilbert, Professor of Clinical Epidemiology, University College London
Mark S Gilthorpe, Professor of Statistical Epidemiology, University of Leeds
Robbie Foy, Professor of Primary Care, University of Leeds
Keith Godfrey, Professor of Epidemiology and Human Development, MRC Lifecourse Epidemiology Unit and NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust
Richard Houlston, Professor in Molecular and Population Genetics, The Institute of Cancer Research
David J Hunter, Richard Doll Professor of Epidemiology and Medicine, University of Oxford
Hazel Inskip, Professor of Statistical Epidemiology, University of Southampton
Deborah A Lawlor, Professor of Epidemiology, MRC Integrative Epidemiology Unit at the University of Bristol
Adrian R Martineau, Professor of Respiratory Infection and Immunity, Queen Mary University of London
Nuala McGrath, Professor of Epidemiology & Sexual Health, University of Southampton
David McCoy, Professor of Global Public Health, Queen Mary University London
Martin McKee, Professor of European Public Health, London School of Hygiene and Tropical Medicine
Klim McPherson, Emeritus Professor of Public Health Epidemiology, University of Oxford
Miriam Orcutt, Senior Research Fellow, Institute for Global Health, University College London
Bharat Pankhania, Senior Clinical Lecturer, University of Exeter
Neil Pearce, Professor of Epidemiology and Biostatistics, London School of Hygiene and Tropical Medicine
Richard Peto, Emeritus Professor of Medical Statistics and Epidemiology, University of Oxford
Andrew Phillips, Professor of Epidemiology, University College London
Jugnoo Rahi, Professor of Ophthalmic Epidemiology and Honorary Consultant Ophthalmologist, University College London
Elio Riboli, Professor of Cancer Epidemiology, Director of Public Health Research, School of Public Health, Imperial College London and Imperial College Healthcare NHS Trust
Paul Romer, Professor, New York University
Paul Roderick, Professor of Public Health, University of Southampton
Sonia Saxena, Professor of Primary Care and General Practitioner, Imperial College London
Anne Wilson, Lecturer in Epidemiology, Liverpool of Tropical Medicine
Guiqing Lily Yao, Professor of health economics, University of Leicester