

AN EVALUATION OF THE MEDICO ECONOMIC AND ENVIRONMENTAL IMPACT OF COVID 19

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[Covid 19 is a new type of corona virus that causes illness in people by affecting their lungs and therefore, their breathing. In severe cases Covid 19 infection may cause pneumonia, severe acute respiratory syndrome, multi organ failure and even death. This virus has the potential to destabilize the economic and financial reality of the world's population. The psycho social impact of Covid 19 cannot be overlooked or understated. The present article makes an attempt to evaluate the medico economic and environmental impact of Covid 19. The paper concluded by providing a message that this crisis does provide an opportunity to tackle some of the longstanding problems that have faced our societies, however, it is up to us whether we seize this opportunity for change.]

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Introduction

Coronaviruses are a group of related RNA viruses that cause diseases in mammals and birds. In humans, these viruses cause respiratory tract infections that can range from mild to lethal.

Mild illnesses include common cold (which is also caused by other viruses, predominantly rhinoviruses), while more lethal varieties can cause Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) and COVID-19.

COVID-19 is a new type of corona virus that causes illness in people by affecting

their lungs and therefore their breathing. In severe cases, COVID 19 infection can cause pneumonia, severe acute respiratory syndrome, multi organ failure and even death. The name COVID-19 comes from Corona virus Disease 2019. The virus has been declared a pandemic by the World Health Organization (WHO). The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that people practice respiratory etiquette (for example, by coughing into a flexed elbow).

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Common Symptoms of Infection	Associated Symptoms
<p>The most important sign symptoms are recent onset of any of the following:</p> <p>A new continuous cough, meaning coughing a lot for more than an hour or experiencing 3 or more episodes of coughing in a day</p> <p>A high temperature</p> <p>A loss of, or change in, normal sense of smell or taste (anosmia)</p> <p>For most people coronavirus (COVID-19) will be a mild illness.</p> <p>However, if people have any of the symptoms above they should self-isolate at home straight away following local guidelines.</p>	<p>Taste / olfactory disorders- new anosmia</p> <p>Neurological - stroke</p> <p>Ocular manifestations - conjunctival hyperaemia, chemosis, and increased secretions.</p> <p>Cardiovascular events - myocardial injury, cardiac arrhythmias, heart failure</p> <p>Venous and arterial thromboembolic disease</p> <p>Gastrointestinal - diarrhoea</p> <p>Multi organ dysfunction</p>

People are described as clinically vulnerable if they are

1. Aged 70 or older
2. Under 70 with an underlying health condition listed below:
 - a) Chronic (long-term) mild to moderate respiratory diseases, such as asthma, chronic obstructive pulmonary disease, emphysema or bronchitis
 - b) Chronic heart disease, such as heart failure
 - c) Chronic kidney disease

- d) Chronic liver disease, such as hepatitis
 - e) Chronic neurological conditions, such as Parkinson’s disease, motor neurone disease, multiple sclerosis or cerebral palsy
 - f) Diabetes
 - g) A weakened immune system due to conditions such as HIV and AIDS, or on medicines such as steroid tablets
 - h) Morbidly obese (BMI of 40 or above)
 - i) Pregnant women
- Uncontrolled, this virus may well cost

millions of lives, but the risks do not stop there.

As individuals we need to take action to prevent, isolate and care for ourselves and others during this crisis.

The four key Public Health Strategy in community settings to prevent spreading the virus are to:

- a) Identify possible cases as soon as possible
- b) Isolate to prevent transmission to other people
- c) Avoid direct contact unless wearing personal protective equipment(PPE)
- d) Get specialist advice from a local microbiologist, virologist or infectious disease physician.

In practical terms, this means that once people are infected by COVID 19they:

- a) Must stay at home
- b) Must not go to work, school or public areas
- c) Must not use public transport like buses, trains, tubes or taxis
- d) Must avoid visitors to your home
- e) Should ask friends, family members or delivery services to carry out errands for them - such as getting groceries, medications or other shopping

We need to understand why isolation is so crucial to stop spreading this virus.

Isolation period may vary from country to country depending on their circumstances.

The most important criteria that determines the virulence of the virus are as follows:

- ✓ Case Fatality Rate(CFR)determines how deadly is this virus
- ✓ Rate of transmission (R0) determines how transmissible is the virus
- ✓ Incubation Period tells us how long does it take to show the symptoms
- ✓ CFR is determined by the number of patients who died from COVID-19 divided by the total number of cases who are infected.

- ✓ High CFRs tend to occur in
- ✓ Places where access to proper healthcare is limited (especially for the most vulnerable) as well as
- ✓ Inadequate national healthcare systems (including limited monitoring and capacity to trigger a timely response).

CFR can be easily manipulated by the total number of infected cases. Consequently, it is crucial to get the total number as accurate as possible. It is not easy to find the exact total of infected cases because many people only develop mild symptoms or may not develop any symptom at all and may remain undiagnosed.

COVID-19 has more fatalities in old and sick people, but it has also killed some individuals with no underlying health problems and also affected young adults and children. This adds another layer of complexity to this virus because the specific mechanisms underpinning how the virus affects the body are still not fully understood.

How Transmissible is this Virus?

R0 (reproduction number) is the average number of individuals estimated to be infected by a single infected person. In the case of COVID-19, every infected person will transmit the virus to 2-4 other non-infected individuals on average and the growth is exponential.

R0 is affected by the following factors:

- a) The number of days a person is infectious (currently estimated at 4-14 days) which is known as its **incubation period**.
- b) The number of people susceptible to be in contact with the infected person (**influenced by self-isolation**)
- c) The likelihood of those non-infected people to catch the virus during that contact (**influenced by hand hygiene, covering the sneezes and coughs, touching the face, etc.**)

When we consider the following facts together, we understand the severity of this situation and the importance of the essential steps that need to be taken by people and governments.

- a) This virus has a relatively long incubation period (4-14 days) and a long course of illness.
- b) It is quite contagious
- c) One person can infect 2-4 people with the CFR of about 0.25-3.00%.

Therefore, in order to efficiently control the COVID 19 epidemic, we need a plan to mitigate its lethality by two specific measures.

- 1. Decrease the number of lost lives (lower **CFR**)
- 2. Reduce the rate of transmission (lower **R0**).

Wearing a Face Mask

There is extensive evidence that healthcare workers, who are trained properly in using masks and are exposed to lots of contagious respiratory droplets, are less likely to be infected while wearing masks.

However, a systematic review of published data (MacIntyre and Chughtai, 2015) reveals that masks do not prevent or reduce the infection in community settings when they are the only measure to prevent infection.

The reason is that

- A. The effectiveness of facemasks is most likely impacted by compliance issues.
- B. If people wear a mask, they must wear it appropriately, which means:
 - a) They must wash their hands before and after wearing or removing the mask.
 - b) They are advised not to touch the front of it – the part potentially exposed to the infection.
 - c) They should avoid reaching underneath to scratch your nose or mouth.
 - d) They should wear it most of the time and discard as soon as it gets damp or moist.

The mental and physical impact of social isolation measures Social isolation measures have severe consequences for mental health, particularly for those who

live alone, and even more so if they have pre-existing health problems. We now know much more about the health-damaging consequences of loneliness, but we must also think about the practical difficulties that people face, like buying food or getting medicines.

Again, there are enormous differences between developed and poor countries. There has been a digital revolution enabling many people who are physically isolated to maintain virtual contact with their friends and families, but sadly, once again, this is not the case in many of the world's poor countries.

Additionally, we're not all experiencing social isolation in the same way. Not everyone lives in a happy family home. We need to think about how we can support victims of domestic abuse who are confined to their homes, unable to escape their abuser.

We also need to think about the risks of exploitation of young people who are not in school. There is further concern around an increase in health-damaging behaviours. Being stuck at home can be very boring, and it's not helped by the cancellation of things like televised sports events. Though it seems that access to illicit drugs has reduced in many countries because of the difficulties faced by suppliers, in these circumstances, there's a real risk that people look for relief in alcohol. Perhaps the greatest risk of all is the gambling. We're now understanding much more about how gambling companies exploit vulnerable people, and many companies are likely to see this pandemic as an opportunity.

The Disruption of Essential Services and Education

We've already seen how some national health services in the UK have stopped many of their routine activities to concentrate on COVID-19. At the same time, people with other conditions are reluctant to go to hospital for fear of becoming infected. In some countries, the number of people attending hospital with heart attacks has fallen by about half. At least some of the excess deaths being recorded are due to people not seeking care when they need it.

Similarly, the majority of the burden of education disruption falls unequally on different socio-economic groups and on people living in countries with weaker education systems. Some children will be able to connect with their teachers virtually on the internet, but many will not. Looking ahead, there is a real danger of a lost generation.

Social Disorder and Fear

Throughout history, pandemics have caused people to look for someone to blame. Sadly, there have been a number of accounts of racist attacks, sometimes encouraged by comments from politicians. It's important to guard against stigmatising groups within our society. The psychosocial impact of COVID-19 cannot be overlooked or understated. While political leaders must communicate the risks involved and the progress being made in combating the pandemic, we also need to recognise that this is likely to instil fear and anxiety in many people. This could be a major

barrier to returning to normality, as it will likely be a long time before many people are willing to go into crowded places, such as entertainment venues and on public transport. People may get anxious about unavoidable contact. As more people begin to hit the streets, the idea of people getting a little too close to us may be a concern. However, whilst we need to adhere to the advice about staying two metres or one metre apart from those outside of our household, a short brush past should not cause undue concern. Brushing past someone shouldn't have any effect at all.

Some experts believe that one has to spend about a minute or two with someone before starting to get the amount of virus that's needed to transmit. People who are sneezing and coughing could cause more of a problem. People who are sneezing and coughing, will be shedding lots of virus. In some ways, less reliance on public transport is an area where there may be some good news. The reduction in vehicle traffic in some places has meant that it may be possible to see blue skies for the first time in decades. However, there is a risk that if people are fearful of using public transport, they'll turn to cars which may create more severe consequences for our health and the environment.

Ethical Concerns during COVID 19 Pandemic

Health inequalities and supporting vulnerable people:

Throughout the pandemic, focus needs to be on the medically and socially

vulnerable people like the elderly and people with co-morbidity as mentioned above and also the homeless people, allowing them to be targeted for additional medical and social support.

Children and adults continue to be abused and neglected throughout this time. Some may be at higher risk, for example:

a) Children, young people and vulnerable adults who are already at risk of abuse or neglect, may be more at risk as their normal support mechanisms are not in place and frontline professionals have less capacity to support and safeguard.

b) Adults who are vulnerable and isolated may be at increased risk of financial exploitation by some pretending to help.

c) Families may be under increased amounts of stress due to new financial pressures, household isolation, school closures and lack of normal outlets for stress and frustrations.

d) For patients who are victims of domestic abuse, self or household isolation could mean that they are at additional risk of abuse, trapped in their homes with their abusers and isolated from the people and the resources that could help them.

e) Subtle signs of abuse and / or neglect may not be as obvious during phone or video consultations. Victims of abuse may be unable to speak freely if consulting from home.

Communication channels should be kept open with other key health/social care professionals who are involved in the care of vulnerable children and adults.

We should continue to share information

as we would normally for the purposes of safeguarding, including strategy meetings, child protection and adult safeguarding enquiries, safeguarding case conferences via video links.

Prior to the 2009 flu pandemic, the Government of UK issued an Ethical Framework in 2007 which was revised in 2017. It is designed to help people think through strategic aspects of decision making during a pandemic, as well as providing an ethical compass for care providers.

The following is a summary of the framework's guiding principles, consistent with the relevant British Medical Association COVID-19 ethics guidance.

a) Equal Concern and Respect : everyone should be treated equally, but this does not mean that everyone will be treated the same. The interests of each person are the concern of all of us, and of society.

b) Respect: people should be kept as informed as possible, have the chance to express their views on matters that affect them, have their personal choices about care and treatment respected and where they cannot decide, have decisions made in their best interests.

c) Minimising the Harm of the Pandemic: we should try to reduce the spread of the pandemic, minimise the risk of complications, learn from experience (home and abroad), and minimise disruption to society.

d) Fairness: everyone matters equally. People with an equal chance of benefiting from resources should have an equal

chance of receiving them – although it will not be unfair to ask people who could get the same benefit at a later date, to wait.

e) Working Together: we need to work together to respond to the pandemic, helping one another, taking responsibility for our own behaviour and being prepared to share information that will help others.

f) Reciprocity: based on the concept of mutual exchange, if people take increased risks or face increased burden, they should be supported in doing so and risks and burdens should be minimised as far as possible.

g) Keeping Things in Proportion: information should neither exaggerate nor minimise the situation and should be as accurate as possible. Decisions taken to protect the public from harm should be proportionate to risks and benefits.

h) Flexibility: plans should be adapted to new information and changing circumstances.

i) Good Decision-making: good decisions will be open and transparent, inclusive, accountable and reasonable.

Sometimes, there will be tension within and between these principles and a judgement may have to be made on the priority to be given to each principle in the context of particular circumstances.

Challenging Conversations within this Ethical Framework

Personal Versus Professional Challenge

How can I manage my professional obligations and my obligations to my family?

This is incredibly hard and represents a genuine dilemma. As a healthcare professional the doctors, nurses, paramedics and other health care workers have obligations to their patients and their employer, but also have obligations to their families.

What can they do if those obligations clash? There is no straightforward answer, and much may depend on the exact nature of individual concern. Are they concerned about leaving their families whilst they are working, or are their concerns about exposing their families to risk of infection?

How one resolves this will be very personal and will depend on his or her unique situation. Some examples are as follows.

- a) Is he or she a single parent?
- b) Is he or she struggling with childcare?
- c) Does he or she live with people who have care needs or who are particularly vulnerable?
- d) Is he or she at increased health risk from COVID-19 infection?
- e) Are there ways that he or she can amend working hours or duties according to his or her circumstances and needs?

Overall, a 'greater good' approach might suggest that one should do whatever one can to mitigate the possible harms to the family and continue to work.

According to the principle of **reciprocity**, if people are asked to take increased risks, or face increased burdens, during a

pandemic, they should be supported in doing so. Employers and organisations need to minimise these risks and burdens as far as possible.

Self-isolation and Feeling Guilty about leaving the Work on Other Colleagues

People often feel guilty if they feel letting others down, but, feeling guilty does not always mean someone has done/is doing something wrong.

If people are self-isolating because they may pose an infection risk to others, they are doing the right thing by staying away. They must observe the current social distancing and self-isolation measures in order to protect their colleagues and patients. If they are feeling well enough, there may also be remote work that they can be engaging with to help their organisation.

Someone may question, 'I'm feeling so anxious/worried/stressed, I am not sure I am making good decisions. Should I carry on or stop?' This is an absolutely healthy and normal response at times of threat. Anxiety tells us that there is a threat (COVID-19) which needs to be responded to (social distancing, isolation, hand washing, PPE).

Anxiety is experienced as

- a) Physical symptoms (restlessness, tension, palpitations, butterflies) and
- b) Mental symptoms (worry, rumination, preoccupation and intrusive thoughts and imagery).

We also see *anxious behaviours* such as

- a) Excessive checking of news items and social media feeds
- b) Avoidance of everyday mundane tasks and
- c) Repetitive reassurance seeking from colleagues and loved ones.

Symptoms tend to subside for most of us as the situation evolves, as we gain more control over our environment, learn more about the threat and its consequences and use task-orientated activities to distract our bodies and our minds.

If symptoms do not subside or if they begin to interfere with daily living or sleep then this might be the time to take action, even to pause from doing tasks, including work, and to seek help.

Environmental Impact of COVID 19

The outbreak will have profound and lasting economic and social consequences in every corner of the globe," says United Nations Environment Programme (UNEP) Executive Director Inger Andersen.

The pandemic has exposed that gains made to address poverty, hunger, good health and well-being may face serious setbacks, unless the global community also urgently addresses the global environmental threats that have similar capacity to gravely undermine the systems that enable humanity and the planet to survive and thrive. Streets are empty, cities are silent, factories are closed and skies are quiet. Surely this has to be good for the environment. Satellite images are showing dramatic drops in air pollution in coronavirus hotspots around the globe.

Considering the negative activities, are there any ways that this pandemic has had a positive outcome? The major environmental issues are: overconsumption of natural resources; diminishing quantity and quality of fresh water; climate change; and rapid population growth. What might be the impact of these issues on our climate?

Short-term Changes

Air pollution levels have dropped significantly since measures such as quarantines and shutdowns were put in place to contain COVID-19. Around the world, levels of harmful pollutants like NO₂ (nitrogen dioxide), CO (carbon monoxide), SO₂ (sulfur dioxide) and PM_{2.5} (small particulate matter) have plummeted—at least, while shutdowns continue. NO₂ is mostly emitted from burning fossil fuels in transport, industry and electricity generation, which makes it strongly linked to human activity. Evidence indicates reduction in biochemical oxygen demand and coliform levels in rivers, improvement in air quality as a result of reduction in the loading of nitrous oxide, particulate matter, and other pollutants. The extent of recovery seen would not have been possible without extreme measures that have been forced on the society due to the pandemic, at the cost of several trillions of dollars across the globe. This enormous unintended experiment offers opportunities for unprecedented insights about the dynamics of our natural and built environment, and societal systems that can lead to feasible paths for preservation of recovered systems and

new recovery pathways through sensible policies and practices.

Long-term Consequences

Experts warn that despite lower air pollution levels in the short term, our environment may not see any long-term benefits. This situation occurred following the 2008 global financial crisis, when greenhouse gas emissions rebounded as the economy recovered. Here is the more chilling aspect of the situation. There has been some question regarding modern society's role in causing the pandemic in the first place. The argument is based on the wildlife origin of this virus (and most others). As we decrease the area of animal habitat, especially in the tropics, forcing more animals into populated areas, it has been suggested that human-wildlife contact is increased, promoting virus transfer, as was apparent with Ebola.

So the same thing, land use that contributes to climate change, also exacerbates viral transfer. This has consequences in that human population explosion leads to both increased land use for agriculture and greater population density and thus increased transmission. Concerns have also been raised that environmental policies will be relaxed in some countries and that investment in renewable energy technology will slow. When the lockdowns are lifted and life returns to what it once was, so too will the pollution that clouds the skies and with it the greenhouse gases that fuel global warming.

In fact, the rebound could be even worse. The corona virus crisis also threatens local efforts to meet the climate commitments

that have already been made. A simple way that we can implement change as individuals is one that we're already adjusting to: travelling less. However, according to the International Energy Agency the biggest sources of global emissions are power generation, heavy transport and industry. Reducing emissions requires a transition away from fossil fuels to cleaner energies, as well as greater energy efficiency. That takes action from governments and industry leaders, not just individuals.

Economic Impact of COVID 19 Health Crisis:

Health vs Wealth

This new COVID-19 outbreak is a landmark event that has the potential to change the world. This virus has the potential to destabilise the economic and financial reality of the world's population,

- a) by halting trades
- b) by closing borders
- c) by increasing distrust between countries and people.

We can start by looking at the impact of the responses that have been adopted around the world.

Many countries-imposed restrictions on what people can do with the objective of reducing the opportunities for transmission of the virus, which are

- a) limits on non-essential travel outside the home
- b) closure of shops and entertainment venues

c) bans on mass gatherings.

People who are unable to work during the pandemic, risk of losing their income and face possible unemployment if businesses fail. We know from our previous experience, like in the global financial crisis of 2008, that loss of income or employment has profound consequences for health, and in particular, for mental health. It's a source of great anxiety for those affected. There are things that governments can do to reduce these risks, but only if they already have the resources and systems in place that are necessary to respond. Many rich countries have introduced schemes that provide a basic income for those unable to work. This provides some immediate security, but, as importantly, it provides relief for the businesses in which they work, keeping these jobs open so that they can recover quickly while its restrictions are lifted. Of course, unfortunately, there are many countries where this is not going to be possible. The travel industry has taken the biggest hit so far as flights are cancelled and increasing amounts of people are put off travelling due to containment concerns and government restrictions.

In a worst-case scenario this could result in workers losing jobs or seeing their hours cut. The knock-on effect of this would leave areas that rely on tourism struggling in the coming months and even years to come. Additionally, disruption of global supply chains will hold up business, which, combined with travel restrictions, could spell global recession.

What does this mean for Workers?

The UK government's four-stage plan consists of: containing the virus, delaying its spread, researching its origins, and mitigating its impact. The delay phase saw the UK closing schools, banning mass gatherings and advising offices to work from home. However, retail, hospitality and other customer-facing industries suffered from a severe loss in earnings. With COVID-19's classification upgraded to 'notifiable disease', this means insurance claims should be easier to make. Whether this will happen or not is still unclear. Those forced to take time off work might not be subject to Statutory Sick Pay in the UK if leave is extended, leaving many out of pocket.

At the moment, it would seem all eyes are on the insurers. How far will losses be covered, if at all? It's been reported that despite the reclassification of the disease, thousands of businesses may not be able to claim. The Association of British Insurers have reportedly announced that all losses are 'unlikely' to be covered. For example, the events industry may feel the sting as people cancel and postpone gatherings as a precaution. Insurers may only cover losses if the virus is found on-site. Those countries worst hit by coronavirus will undoubtedly be those unable to implement tough travel and quarantine restrictions.

Poorer countries will see a decline in tourism, whilst richer countries will implement emergency pandemic protocols to cope with the increased

demand on the health service and minimise economic losses. With a vaccine still in development, cases will multiply and businesses will grapple with the situation as it unfolds. What remains paramount is the spread of information – in itself a huge problem in poorer countries with limited digital infrastructure. As more and more countries are affected, lessons are being learnt from other parts of the world. As our understanding of the virus is evolving, it's a good idea to keep up with the latest advice from an official source, such as the Government website and WHO as appropriate. People should try to avoid shared posts on Facebook, Whats App and other social platforms or reading worrying headlines on the virus, as certain sources might not present reliable information. Acknowledging a concern and taking measures to stay safe are advisable. But if our thoughts and worries become out of control or begin to affect our day-to-day lives disproportionately we may be suffering from anxiety or from agoraphobia- which is an intense fear of being in public places where you feel escape might be difficult.

Solution of the crisis

As the world struggles to contain a rapidly spreading pandemic, hundreds of thousands of people are fighting for their lives and the global economy is in danger of lurching to a halt. This is putting billions of livelihoods in danger. The economic impact of the coronavirus is shaping up to be significant; and with fears of a global recession looming, the virus could have serious long-term

implications for business.

The countries now need support because in many businesses' revenue streams are disappearing, many companies are worried about losing the talent they have nurtured as they are forced to make lay-offs. Some countries designed schemes to protect the work force. Examples are as follows:

a) In Germany the scheme is called *Kurzarbeit*, meaning shorter working time, and proved very successful.

In simple terms, the *Kurzarbeit* scheme sees the German government covering a significant proportion of the costs of employees' salaries in times of crisis so businesses do not need to make redundancies.

b) Perhaps the most far-reaching scheme set up in recent days was in Sweden. Here the government heavily subsidized workers' salaries so that they will still receive 90% of their pay while working reduced hours.

Alongside this, businesses have been allowed to defer tax payments for up to a year at a cost of €27.5bn to the country's treasury, equivalent to 6% of gross domestic product.

c) Denmark announced similar measures; it is subsidizing 75% of salaries for firms promising not to lay-off staff.

d) Governments in mainland Europe deployed a mixture of tax moratoriums, payment extensions on social charges, loan guarantees and wage subsidies for workers who cannot work or move to part-time roles.

e) In France, the president has promised unlimited budgetary support for companies and workers that may cost about €45bn.

f) Italy made plans for one-off payments of €500 for each self-employed individual.

g) Spain announced a moratorium on mortgage repayments and utility bills for people whose income has been hit. He also issued a decree making it easier for firms to temporarily suspend, as opposed to lay-off workers while their benefits would be retained.

h) The UK government took inspiration from the German scheme. UK's Coronavirus job retention scheme, known as furlough scheme, was designed to protect millions of jobs and businesses across the UK. The furlough scheme should help people who are on leave because of the outbreak, and should prevent mass redundancies.

i) UK workers of any employer who is placed on the Coronavirus Job Retention Scheme can keep their jobs, with the government paying up to 80 per cent of a worker's wages, up to a total of £2,500 per worker each month. The scheme was backdated to 1 March and was initially open for 3 months and then extended. The payment extensions on social charges, mortgages, loan guarantees were also introduced with reduction of Bank of England's base rate.

One thing that history has shown us is that a crisis can produce real change. The power of collective action will become

evident. True leadership will emerge. The impossible will surface as inevitable. Innovative ideas and policy solutions will take hold, save lives and eventually get the economy back on track. Innovative approaches are now needed to address the questions arising from this pace of change, as the immediate crisis response shifts into a second phase, likely to continue until a vaccine or treatment is widely available.

Aside from more visible innovations, what other changes are taking place? What is their impact on quality? Now the policymakers, clinicians, managers, economists and the public should come together to decide what should be sustained, and what discarded, often in the absence of definitive evidence. One step on this front is to create more distributed, agile means of capturing and sharing learning from local innovation, for which there is clearly great appetite. People should try to avoid shared posts on Facebook, WhatsApp and other social platforms or reading worrying headlines on the virus, as certain sources might not present reliable information; which might not be evidence based.

Acknowledging a concern and taking measures to stay safe are advisable. But if our thoughts and worries become out of control or begin to affect our day-to-day lives disproportionately we may be suffering from anxiety or from agoraphobia - a fear of public spaces. Another challenge is how to assess the impact of our decision making on what's working, what to adapt, and what to retain, in the absence of the usual

carefully controlled management processes of planning, piloting, commissioning, evaluating and monitoring. This starts getting a better with understanding of the acceptability of these changes. Public attitudes to particular innovations will be the key to what is sustained, and may shift with experience and given the increased risks of face-to-face social and professional interactions.

We also need to understand the impact on experience and outcomes. We know the spread of an innovation in itself doesn't mean we can be sure of getting the same results everywhere, as quality of implementation and local context matter. Some innovations may also risk exacerbating existing inequalities.

So, while national research efforts are for now rightly prioritised on urgent public health and clinical questions, decision makers will also need rapid evidence of the impact of service changes, to understand their benefits and any unintended consequences of economic impacts.

Emerging models here include the use of citizen science methods to gather perspectives from safety experts. In the absence of the usual events and conferences, new forums will be needed where policymakers, managers and clinicians can debate emerging evidence. System partners and knowledge brokers, social media influencers and professional communities will all play a critical role in making this evidence visible, interpreting it and ensuring it informs, and is informed by, the rapidly moving changes in the practice and experiences of the public.

Finally, leaders throughout the health and care system need help to make sense of the huge range of innovation and research underway, particularly at a time of relentless and intense operational pressure – to feel their way towards a more sustainable balance of acting and thinking. Looking ahead, the one thing that we can say with certainty is that societies will change. They always have after major disease outbreaks. Whether this was the Black Death in Europe in the 14th century which contributed to a series of peasant revolts and the reformation, or the influenza pandemic in 1918 which contributed to increasing support for social security.

The main message is that this crisis does provide an opportunity to tackle some of the long-standing problems that have faced our societies, however, it is up to us whether we seize this opportunity for change.

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