Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

International Journal of Surgery 81 (2020) 122–129

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.elsevier.com/locate/ijsu

Review

Health policy and leadership models during the COVID-19 pandemic: A review

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ARTICLE INFO

Keywords:
Novel coronavirus
COVID-19
Leadership
Healthcare policy
Management

ABSTRACT

On March 11, 2020, the spread of the SARS-CoV-2 virus was declared a pandemic by the World Health Organization (WHO). Approximately 19.3 million people have now been infected and over 700,000 have died. This global public health crisis has since cascaded into a series of challenges for leaders around the world, threatening both the health and economy of populations. This paper attempts to compartmentalise leadership aspects, allowing a closer examination of published reports and the analysis of current outcomes, thus enabling the authors to formulate a number of evidence-based recommendations on the de-escalation of restrictions.

1. Introduction

On March 11, 2020, the spread of the SARS-CoV-2 was declared a pandemic by the World Health Organization (WHO) [1]. The pandemic has caused a worldwide turmoil in all aspects of life; it has swamped healthcare systems, continues to threaten the economy into a recession expected to be worse than that seen in 2008 [2,3] and continues to challenge established leadership models [4].

Shingler-Nace [5] identifies five elements to successful leadership during this crisis: Staying calm, communication, collaboration, co-ordination and providing support. We have expanded on these elements and have further focused on situation monitoring, funding and surgical preparation. As world leaders, healthcare executives and clinical leads scramble to establish 'best practice' models moving forward, we describe these strategies and assess their efficacy based on published reports, analyse current outcomes and offer evidence-based recommendations on de-escalation of restrictions in an attempt to aid policy makers during these crucial times. We also identify leadership issues and ethical dilemmas which may arise amidst the pandemic and describe their effect on implementation of policy.

2. Leadership compartmentalisation

2.1. Planning and coordination

Planning is key in any national crisis and especially in a pandemic that affects every element in society; effective coordination is therefore essential. This coordination must happen at a national, regional and local level with lines of communication between each. Under these unique circumstances, this should be done virtually [6]. As part of planning, it is also prudent to utilise previous pandemic preparedness plans and mitigation strategies which will be discussed in section 2.5 as an independent entity.

At a local level, hospitals are advised to set up local incident management teams [7] consisting of a clear chain of command including a clinical director, a managerial director, a single point of reference to regional command centres [8] as well as public health specialists. This is important for the relaying of national directives to clinical staff delivering care and to ensure they follow the latest up to date best practice whilst able to use individual clinician discretion. A similar structure should also be followed in individual hospital service delivery settings with lead clinicians identified who are capable of coordinating an

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https://doi.org/10.1016/j.ijsu.2020.07.026
Received 29 May 2020; Received in revised form 28 June 2020; Accepted 12 July 2020
Available online 17 July 2020

effective response in their area of expertise.

Regionally, coordination must be also established within a local health system. This is relevant both for large urban conurbations with closely linked populations as well as more sparsely populated rural health systems [9]. Regional coordination is needed for the pooling of resources, the sharing of clinical best practice, the coordination of workforce sharing and redeployment as well as being essential for the interface between primary, secondary and emergency care providers to collaborate and manage patient pathways. Regional response teams can consist of small municipal regions or larger national subdivision regions, such as Federal States or Administrative Regions, who link with national systems.

Finally, national coordination. Strong national leadership provides unity of purpose and strategy as well as coordination with other countries [9] for resources and coordinated responses. Each country uses its nationally agreed upon procedures with the most common response team consisting of the Head of Government, Health Minister, Chief Medical Officer/Lead Public Health Officer, Epidemiologists and Virologists as well as civil defence/military representatives. A similar structure can also be replicated on a more regional basis.

2.2. Situation monitoring and assessment

Given the expeditious nature of its transmission and severity of disease, accurate monitoring and assessment is crucial for enabling an effective response. Despite transparent reporting and collaboration between the majority of national and international public health agencies, variability in testing criteria may contribute to a misleading epidemiological picture [10]. For example, due to a limitation in laboratory testing capacity, countries such as Spain and Italy have recalibrated their eligibility guidelines resulting in more stringent criteria (e.g., only those with severe symptoms or at high risk due to comorbidities will receive testing) [10]. This may lead to expressions of a flattened epidemic curve, potentially causing a misinterpretation of the epidemic's true status. Furthermore, some countries, such as South Korea, have shifted to more liberal eligibility guidelines (i.e., a greater number of people are tested) which may result in a steepening of the curve's gradient [11]. Appreciating the evolving nature of national testing efforts is crucial when formulating a plan of action for COVID-19. Garcia-Basteiro et al. [10] argue the two indicators most resilient to changes in testing capabilities - and thus should be relied upon when monitoring and assessing a situation - are incidence risk of hospital admissions and mortality rate.

2.3. Communication

Effective communication is a key attribute of successful leaders during a public health crisis since even the most efficient and best strategies may be rendered ineffective by inadequate or ineffective communication at government level, or communication that fails to be integrated successfully into the community. In fact, poor communication may exacerbate the existing threat. The plans employed by national authorities must reflect a thoughtful, effective, informative, and evidence-based approach [12].

As a result of the dynamic nature of a pandemic, complete transparency and prompt communication of both real and potential risks is necessary. Social marketing and health promotion, particularly during the preparation phase of a public health risk, ensures the delivery of crucial health protection messages. Evidently, these factors are important because the quality of the resulting societal response such as social distancing and self-isolation, depends partly on meeting these specific communication and outreach needs. In addition to the importance of communication as part of the preparation phase of a pandemic, leaders should be mindful of the importance to continually inform, update, and promote its population on the existence of known, proven, and/or recommended guidelines and interventions to protect the general public and speed recovery. This ensures that any risk at both the population and individual level is mitigated.

The delivery of continual and factual information to the public and all stakeholders on the pandemic's current state, and throughout every stage of planning, response, and recovery, is equally as significant. Such delivery has to be clear and focussed. If mistakes happen or performance falls short, governments should be honest with the public. Although the potential mortality, morbidity, life and economic disruptions may be difficult to predict, it is nevertheless vital that these concerns and harsh realities be communicated. Since leaders are public figures upon which others will depend for reassurance and guidance, in turn fostering resilience and recovery, they must refrain from communicating any false or non-evidence-based scientific information that may lead to panic and negative health outcomes. Evidently, reducing any negative consequences relies heavily on gaining the trust and cooperation of a substantial body of countrywide entities. Post-pandemic, leaders should publicly acknowledge the contributions of all key-workers, services and communities. Leaders also play a critical role in detailing the lessons that have been learned, to enable prompt action in the event of future public health crises. These lessons can lead to the active incorporation of those approaches proven to be most effective into existing governmental strategies. Overall, communication is key to building trust, developing effective guidelines and principles, and to ensure the prevention and containment of disease. However, it is nevertheless important to note that good communication practices will not substitute for poor planning or misconceptions.

2.4. Funding, PPE and testing

It is important that global leaders ensure the appropriate allocation of funds towards medical supplies and personal protective equipment (PPE) to help meet the ever increasing demand. This fundamental priority is key to protecting frontline healthcare staff and to preventing further viral transmission within the hospital setting. Examples of necessary PPE include masks, visors, gloves, aprons and gowns. In the UK, the British Government has endeavoured to allocate £6.6 billion from the Government's coronavirus emergency fund to the NHS, following on from an initial contingency fund of £5 billion [13]. The European Commission have also announced plans to create a strategic stockpile of medical equipment with an initial budget of €50 million to support EU countries [14]. Funding may additionally be used to free up hospital beds, purchase intensive care medical equipment including ventilators, diagnostic kits, therapeutic supplies, and laboratory equipment to support research and development.

Regarding testing, leaders must ensure the development of sustained diagnostic capacity, the establishment of adequate testing schemes, and ensure the rapid validation and deployment of serological testing. In the UK, the implementation of a nation-wide coronavirus testing programme (via a home testing kit or a pre-booked regional test site) enabled all individuals who develop symptoms of the disease to be tested [15]. In the EU, aggressive testing of all 3,300 inhabitants of the town of Vò, near Venice, irrespective of the presence of symptoms, enabled the spread of infection to cease [16]. As of July 20, 2020, Italy has conducted approximately 6,238,049 tests [17]. In Asia, Taiwan has achieved international praise for its handling of the COVID-19 pandemic. As of July 20, 2020, Taiwan has conducted 79,645 tests, with 455 confirmed cases and 7 deaths [18]. These successes have highlighted the importance of testing and isolation, in otherwise healthy individuals, to leaders on a global scale.

2.5. Mitigation and containment

The overwhelming cases of COVID-19 have forced global leaders to adopt containment measures in an attempt to suppress the spread of the disease. South Korea has taken the global lead in containment of the virus as they have focused greatly on mass testing, early contact tracing

and successful quarantine. In other parts of the world, namely China, Spain, Italy and the US, raising numbers of daily cases prompted governments to switch from containment to mitigation strategies [19]. In doing so, non-pharmaceutical interventions (NPIs) have been implemented worldwide having a great effect in managing and limiting social contact [20].

A recent Belgian study suggests that 'Flattening the Curve' strategies in an attempt to develop herd immunity – in essence reducing the Reproduction number (Ro) to less than 1 - are 'unfeasible'. Using the susceptible, exposed, infected, and recovered (SEIR) model, they predict that supplemental ICU capacity will need to be maintained for several years, inadvertently overwhelming healthcare systems worldwide. Moreover, an outbreak of the disease will be observed if R0 raises above 1, overloading an already saturated healthcare system. When Ro falls to less than 1, the disease is predicted to disappear for a period, effectively extending the time required to build up herd immunity [21].

It is clear that as countries enter different stages of the pandemic, leaders must develop the courage to abruptly alter the course of the health policy when needed. As new scientific evidence emerges rapidly, it is prudent that policy makers regularly update their response to meet this scientific evidence, learn from other countries' responses and aim to enhance their own. In doing so, they can adjust lockdown measures in an accurate and timely manner and maneuver through implementation of NPIs appropriately.

2.6. Predictive mathematical modelling

Varying mathematical models have been formulated across countries, offering direction to governments regarding appropriate interventions. It should be noted, however, the utility of modelling largely stems from its ability to define the effect of interventions rather than providing precise quantitative predictions [22]. Nevertheless, the predictive function of mathematical modelling holds an important role for governmental responses and target-setting.

Crucially, the values produced by these models are dependent on the quality of the data employed. At the primordial stages of an epidemic, quality of data is limited by inconsistencies in national detective efforts and inadequate documentation [23]. Indeed, execution of decisions without reliable data has been a key concern of epidemiologists [24]. Moreover, even as many countries are in the midst of the pandemic, factors such as accuracy of tests, population characteristics, and the possibility of reinfection add a layer of complexity when modelling. Thus, when relying on models, attention should be paid to the key assumptions of the report – particularly, how sensitive to errors these assumptions are.

A model released by the Institute of Health Metrics and Evaluation (IHME) has purported specific predictions in relation to the US which include the day on which cases will peak [25]. This model has subsequently been widely referenced by officials in Washington, D.C. as guiding decisions for policy. Predictive modelling becomes further complicated when faced with large countries, such as the US, as the epidemic unravels differently in sub-populations. Variability in prevalence of comorbidities, age, environment, and genetic disposition may result in a wide range of feasible outcomes which differ dramatically from state to state [26]. Indeed, the long-term mortality projection for New York by the IHME model shifted upwards by 60% in under a week at the end of March. This volatility and dynamic nature demonstrates the importance of avoiding the overinterpretation of models: leaders should be appropriately circumspect in their claims when basing their communication on predictive mathematics.

2.7. COVID-19 surgical adaptation phases

The COVID-19 pandemic causes a challenge for the optimal and safe surgical management of patients. Al-Jabir et al. summarise the vast effects of the pandemic, spanning across all surgical specialties worldwide, emphasizing the need for prioritization [27,28]. One specific strain for surgical leaders is the need to risk-stratify elective surgery during the COVID-19 pandemic. Following the WHO declaration of the pandemic, the United States Surgeon General advised the cancellation of all elective surgeries in hospitals to prevent the spread of the virus [29]. However, the American College of Surgeons (ACS) later advised the prioritization of surgical resources [30]. The organization advised that each hospital should 'review all elective procedures to minimize, postpone or cancel elective surgery until the predicted point in the exposure graph is passed, to support the healthcare infrastructure' [30,31]. The careful consideration of which surgical procedures to perform during COVID-19 is of utmost importance, due to the risk of spreading the virus further. The Royal College of Surgeons of England provided advice on how to stratify surgical procedures during the pandemic [32]. The guidance advised that prioritization of surgery for patients should be according to a specific classification (Table 1). The categorization of patients aims to help managers plan the allocation of resources, allows surgeons to appreciate the needs of other surgical specialties and facilitate the development of regional surgical networks to sustain the delivery of surgery in a timely fashion [32].

Table 1
The Royal College Surgeons of England stratification of patients for surgery [32].

Priority Level	Operation Timetable
Priority level 1a Emergency	Operation needed within 24 h
Priority level 1b Urgent	Operation needed with 72 h
Priority level 2	Surgery that can be deferred for up to 4 weeks
Priority level 3	Surgery that can be delayed for up to 3 months
Priority level 4	Surgery that can be delayed for more than 3 months

The guidance highlights the importance of documenting the surgical procedures that are deferred to plan for the increase in the time and quantity of the surgical waiting lists [32]. The ACS similarly provided guidance on the surgical prioritization of patients during the pandemic [33]. The guidelines highlight that leaders of institutions should follow a collaborative process to identify principles and frameworks for prioritization, ensuring input from surgery, anaesthesia and nursing [33]. The ACS recommends transparency of the framework utilized in hospital institutions to ensure consistency, reliability and public assurance [33].

One critical aspect of surgical leadership during COVID-19 is to provide roadmaps to ensure scheduling of elective surgery, when it is safe to do so [34]. The ACS, American Society of Anesthesiologists, Association of Perioperative Registered Nurses and the American Hospital Association provided a joint statement on April 17, 2020 to ensure the smooth transition of rebuilding elective surgery following the end of the pandemic [34]. The statement highlighted the need to consider appropriate timing for reopening, COVID-19 testing within the facility, case prioritization and scheduling. With the ongoing unknown timelines of COVID-19, it will be critical to design and implement clinically relevant and patient-safe surgical management guidelines by the leaders of individual healthcare institutions [30].

3. Discussion

3.1. Ethical dilemmas

COVID-19 is raising many ethical medical dilemmas for the leaders of healthcare institutions. Treatment rationing is one of the main problems that is faced among healthcare professionals [35]. With the surge in cases it is unclear how the leaders should ration resources fairly, particularly ventilators for patients on the intensive care unit [35]. Institutional protocols are one way in which healthcare professionals can be guided to making such critical decisions [36]. On April 11, 2020,

the American Medical Association (AMA) released guidelines, a code of medical ethics for healthcare professionals during the pandemic [37]. The guidance provided criteria for limited resources by considering the urgency of medical need, likelihood and anticipated duration of benefit and change in quality of life following the treatment [37]. With the shortage of PPE, physicians themselves will be asked to care for patients infected with COVID-19 without sufficient protection, raising many ethical dilemmas. The AMA guidelines discuss how physicians may ethically decline to provide care if PPE is not available after considering the anticipated level of risk. Unique circumstances of the healthcare professional, including an underlying health condition, may justify the refusal of care. The ACS provided some ethical framework for the allocation of resources in the event of shortages. The ACS advised the use of well-known objective measures to predict mortality, to help guide healthcare professionals treat individual patients [38].

During the crisis, leadership is of utmost importance in helping to solve these medical dilemmas. The AMA advised that as leaders of the healthcare team, such healthcare professionals should advocate for resources and support [37]. The British Medical Association (BMA) provided advice on medical dilemmas during the COVID-19 pandemic [39]. The institution advised that senior leadership should make the decisions on how resources are allocated in difficult situations [39]. The decisions should be based on the best available evidence, agreed in advance where practicable, communicated openly and transparently and subject to modification and review as the situation develops [39]. Advice on which patients should be treated during the COVID-19 pandemic was also provided by the BMA. They advised that manager and senior clinicians must set the thresholds for admission to intensive care units and the use of highly limited treatments including mechanical ventilation.

3.2. De-escalation strategies

De-escalation strategies are required to ensure that societies gradually return to normal practice. A number of considerations are required for successful implementation, since de-escalation that is too rapid or inappropriately timed carries the risk of a rapid upsurge in transmission. In particular, surveillance data and seroepidemiological population surveys may be used to provide information on the extent and speed of population immunity, which may guide subsequent decisions on de-escalation [40]. Large scale surveys may be achieved via commercial SARS-CoV-2 antibody testing, on the collection of specimens at symptom onset, admission, and discharge. Such tests will additionally form a crucial element to informing first-line responders, key workers, and healthcare professionals of their infection status and to thereby guide safe return to work. Individuals having recovered or endured an asymptomatic transmission may also be able to return to employment without the risk of increased transmission.

For countries having implemented strict physical lock-down measures, a review of existing strategies to ensure the presence of adequate contact tracing (to reduce the risk of disease re-emergence) is required before de-escalation measures are employed. Since stringent physical lock-down can be disruptive at both the societal and economical level, placing further strain on existing nationwide issues, there are already reports of individuals having failed to adhere adequately to these public health recommendations, due to a so-called ‘isolation fatigue’ [41]. Since de-escalation requires the incidence of infection to be reduced to very low levels, there is significant interest in formulating an effective and logical approach to de-escalation with regards to physical distancing interventions. In order to mitigate the possibility of an unprecedented recurrence of increased transmission, inevitably placing vulnerable populations at risk, such approaches should be mindful not to prematurely uplift current bans [42]. Overall, de-escalation strategies should be based on existing public health principles and underscored by scientific evidence and advice.

3.3. Exemplar leadership

South Korea features on the list of countries that are being internationally lauded for their response against COVID-19. On April 30, 2020, South Korea revealed that they did not record any domestic cases of COVID-19, for the first time since their peak on February 29, 2020 [43]. South Korea seems to have managed to turn the tide of COVID-19, despite emerging as the second biggest virus hotspot, behind China, in the first two months of this pandemic and despite South Korea's proximity to China, the epicentre of the COVID-19 pandemic [43]. Notably, South Korea achieved control over their outbreak without imposing a nationwide lockdown and hence minimising the impact of COVID-19 on their economy [43]. South Korea's strategies to curb COVID-19 were brought to fruition as a result of a combination of strong national leadership and coordinated, intersectoral response [43]. Their key strategies included:

- **Being prepared and acting quickly** – Unlike several western countries, South Korea didn't take the threat of a COVID-19 outbreak lightly, partly due to its proximity to China but also due to the bitter lessons learned from its Middle East respiratory syndrome-related coronavirus (MERS-CoV) outbreak in 2015 [43]. This is in contrast to China where an outbreak of severe acute respiratory syndrome (SARS) occurred in 2003 but according to Yanzhong Huang, a global public health expert, China's response to epidemics “has not changed at all” and it responded to both epidemics with “inaction, denial and deception” [44].
  The aftermath of MERS-CoV outbreak saw the establishment of a rapid response process for emerging infectious diseases such as the emergency use authorisation (EUA) system by the Korea Centres for Disease Control and Prevention (KCDC), the Korean Society for Laboratory Medicine (KSLM) and the Korean External Quality Assessment Scheme (KEQAS) [45]. In 2016, an external quality assessment (EQA) of the molecular diagnostics, carried out by non-governmental South Korean medical laboratories, for Zika virus and MERS-CoV was sponsored by KCDC and conducted by KEQAS. In addition to evaluating the proficiency of molecular tests performed by non-governmental medical laboratories for Zika virus and MERS-CoV, recommendations were made to conduct regular EQA of non-governmental laboratories involved in the diagnosis of emerging infectious diseases in South Korea in order to bolster the capacity of laboratories able to deal with new pathogens [46].
  On January 7, 2020, Chinese authorities confirmed that a novel coronavirus was behind the spike in pneumonia cases of unknown aetiology seen in the country since early December 2019. On January 12, 2020, China shared the genetic sequence of this novel coronavirus with the rest of the world [47]. By the time the first case of COVID-19 was detected in South Korea on January 20, 2020, South Korea had already developed a diagnostic test for COVID-19, KCDC had established public-private partnerships for the development and execution of diagnostic tests to allow for rapid expansion of testing capacity and Korean Food and Drug Administration had expeditiously approved the use of these diagnostic tests for suspected cases [43].
- **Testing** - Diagnostic tests were rapidly rolled out across the country by joining forces with local governments [43]. Both South Korea and the US recorded their first case of COVID-19 on the same day in late January; by March 25, 2020, South Korea had tested more than one in every 150 people, in comparison to the US which had only tested around one in every 780 people - this highlights how considerably South Korea increased its testing capacity [48].
  South Korea pioneered drive-through COVID-19 testing; this innovative method of testing is now being used by several countries across the world [49]. Drive-through testing has several advantages; traditional airborne infection isolation rooms (AIIRs) used for testing would have limited South Korea's testing capacity as a result

of limited availability of AIIRs as well as conventional testing procedure in AIIRs taking longer (~30 min) than drive-through testing procedure which takes around 10 min [49]. In addition, drive-through testing was devised to limit the exposure of healthcare workers to the virus while taking samples for COVID-19 testing and minimize the consumption of PPE [50].

- **Tracing** - In order to expand its contact tracing programme, South Korea redeployed government health centre officers across the country to rapidly create a temporary workforce of epidemiological intelligence service (EIS) officers [43]. South Korea's extensive contact tracing programme allowed it to pick up several clustered cases of COVID-19; for example: cases picked up among the members of the Daegu branch of Shincheonji Church of Jesus was linked to patient 31 [51].
- **Triage** - In anticipation of a surge in the number of COVID-19 cases and impending saturation of hospital capacity, a system of triage was created. At the district level, district health centres/hospitals were turned into triage centres assessing people with a fever or respiratory symptoms [43]. A group of university hospitals and university-affiliated hospitals with facilities such as negative pressure intensive care units, ventilators, availability of extracorporeal membrane oxygenation and the expertise of respiratory/infectious disease specialists, were reserved for critically ill COVID-19 patients [43]. Several general hospitals with negative pressure units and respiratory/infectious disease specialists attended to severe but not critically ill COVID-19 patients [43]. Non-clinical facilities were turned into clinical facilities (e.g. accommodation facilities that were previously used for vocational refresher training); this generated more beds that could be used as temporary isolation units, staffed by healthcare workers, for mild to moderate COVID-19 cases [43].

  The healthcare system was divided into: COVID-19 healthcare system and non-COVID-19 healthcare system; this was done to ensure that non-COVID-19 healthcare needs continue to be addressed while the outbreak is managed [43]. COVID-19 healthcare system was responsible for public quarantine, primary health care triage and depending on severity of illness, admitting patients to primary care level temporary isolation units for observation or transferring patients to secondary/tertiary hospitals [43].
- **Transparent communication with the public** - South Korea's Deputy Minister of Health and Welfare and the Director of KCDC held daily briefings to keep the public updated on the number of new cases, number of people being treated, number of deaths and regional distribution of cases; they also kept the public up to date with South Korea's COVID-19 response strategies and informed them about any revisions to regulations [50].

  In addition, South Korea used technology for contact tracing as well as to facilitate open communication with the public. When a person tested positive, their city/district alerted the people living nearby via text messages and a detailed map of their movements, in the days leading up to testing positive, was included; these maps were generated using information gathered from patient/proxy interviews, mobile phone tracking, credit card transaction history and CCTV footage [50]. These text message alerts allowed people to judge their risk of contracting COVID-19 and encouraged them to self-isolate or get tested [50]. Using technology for contact tracing minimised the risk of recall or confirmation bias arising from patient/proxy interviews causing omissions of critical details; in addition, this transparent method of communication helped allay public fear and confusion surrounding their risk of contracting COVID-19 [52].

  Transparent communication with the public is essential to build public trust which in turn is important to ensure that the public complies with government guidance. When South Korea rolled out a campaign urging the public to wear masks, observe social distancing and wash hands regularly, the public willingly obeyed these guidelines, without the country having to impose a nationwide lockdown [53]. Also, the panic buying observed in countries across the world did not occur in South Korea which is a testament to the fact that through transparent communication they were able to allay public fear and build public trust [53].

  However, using technology for contact tracing gave rise to privacy concerns. There were concerns that the detailed map of movements of COVID-19 patients may give away their identity and expose them to social stigma; hence, there were worries that this might deter people from coming forward to get tested [54]. In addition, there were concerns that the businesses visited by COVID-19 patients would be negatively impacted [50]. Having said that, there is overwhelming public support in South Korea for publishing the map of movements of COVID-19 patients; this was demonstrated by the research carried out by Youngkee Ju, a health journalism researcher in Hallym University, Chuncheon [54].

South Korea was able to turn the tide of COVID-19 through a range of leadership strategies such as being prepared, acting quickly, transparent communication with the public, extensive testing and contact tracing and effective triage and resource allocation. In addition to South Korea, some of the other countries being widely praised for their leadership in combating their COVID-19 outbreak include Taiwan, New Zealand, Germany and some nordic countries such as Iceland.

3.4. Lessons learned

The key leadership lessons learned during this global pandemic are described below:

- **Openly communicate with the public** - This is perhaps the biggest takeaway from this global pandemic. On March 19, 2020, China reported that they did not record any domestic cases of COVID-19, just over three months on from the emergence of COVID-19 in the country [44]. However, China's successful efforts in controlling its COVID-19 outbreak are largely overshadowed by grave errors made by China, in the beginning of the outbreak.

  Under the rule of Xi Jinping, a culture of “lazy governance” arose in China; inaction and paralysis on the part of Chinese officials grew as a result of their fear to take initiative or risks. This set the scene for the chain of events that took place in the beginning of the COVID-19 outbreak in China. On December 12, 2019, the first case of COVID-19 was detected in Wuhan. Although, the WHO was notified by China on December 31, 2019 regarding cases of pneumonia of unknown aetiology in Wuhan, China did not warn the public and concealed the seriousness of the outbreak from the public and the rest of the world. On December 30, 2019, Dr Li Wenliang warned that the outbreak was caused by a SARS-like virus; however, he was silenced by Wuhan authorities and was compelled to sign an apology letter for “spreading rumours”. It is understood that president Xi Jinping knew about the outbreak by January 7, 2020; however, he did not take any action until January 22, 2020 when he ordered a lockdown of Wuhan and only then the public realised the seriousness of the outbreak. During this period of 15 days of inaction on the part of Xi Jinping, 5 million Wuhan residents travelled to other Chinese cities and other countries [44].

  Estimates suggest that between December 30, 2019 and January 22, 2020, 11,000 people from Wuhan left for Thailand, 10,680 for Singapore, 9,080 for Japan and 7,000 for Hong Kong – recipe for a global pandemic [44].
- **Act early and decisively –** This was a leadership strategy common to most countries who successfully tackled their COVID-19 outbreak, including New Zealand.

  New Zealand recorded its first case of COVID-19 on February 28, 2020. On May 4, 2020, New Zealand announced that they did not record any new cases of COVID-19, for the first time since mid-

March; as of May 8, 2020, their total number of COVID-19 cases stands at 1490 and their death toll stands at 21 [55].

New Zealand had already been asking all incoming travellers to self-isolate for 14 days; however, on March 19, 2020, New Zealand decided to take the historic step of closing its borders to everyone apart from citizens and permanent residents. Just under a week later, on March 25, 2020, the country went into a nationwide lockdown, although the total number of COVID-19 cases stood at only 102 and the death toll was zero [55]. A few days before announcing a nationwide lockdown, under a month after recording its first case of COVID-19, New Zealand calculatedly decided to follow an elimination strategy to control its COVID-19 outbreak rather than following the usual mitigation strategy [56].

In contrast, when the UK announced a nationwide lockdown on March 23, 2020, their total number of confirmed COVID-19 cases stood at 6,650 and death toll stood at 359 [57]. On May 10, 2020, the UK had the second highest number of COVID-19 deaths in the world, behind the US [58].

- **Test, trace and isolate** – Another feature shared by countries who were successful in controlling their COVID-19 outbreak is their aggressive testing, tracing and isolating programme.

  Iceland has one of the highest testing coverages in the world; approximately 13% of its population has been tested for COVID-19 [59]. This has been attributed as one of the factors behind Iceland's success in controlling its COVID-19 outbreak; the country recorded its first case of COVID-19 on February 28, 2020 and as of May 4, 2020, their total number of COVID-19 cases stands at 1,799 and death toll stands at 10 [59]. In addition to testing individuals who are symptomatic, are close contacts of someone who tested positive or have returned from a high-risk country, Iceland joined forces with deCODE Genetics, a biopharmaceutical company based in the country's capital, to offer testing to asymptomatic individuals; testing offered by deCODE Genetics was open to all Icelanders [60].
- **Invest in pandemic preparedness** – Some of the countries who were successful in limiting COVID-19, were experienced in dealing with outbreaks of infectious diseases. For example: South Korea suffered from a MERS-CoV outbreak in 2015 and Taiwan suffered from a SARS outbreak in 2003; subsequently, both countries invested in pandemic preparedness, which proved useful in their fight against COVID-19 [43,61].
- **Do not ignore any sections of the community; everyone living within a country's borders is at risk of contracting and transmitting COVID-19** - Earlier on during this global pandemic, Singapore was hailed as a success story. On March 23, 2020, around two months after the first case of COVID-19 was detected in Singapore, the total number of COVID-19 cases stood at 509 and the number of COVID-19 related deaths stood at 2 [62]. These admirable statistics, despite Singapore's proximity to China, were a testament to Singapore's exemplar leadership strategies which included acting quickly, keeping the public informed, testing all pneumonia patients, intensive care unit (ICU) patients and patients who died of a probable infectious cause, contact tracing extensively, prompt isolation of confirmed/suspected cases of COVID-19 and placing close contacts under mandatory quarantine while placing lower-risk contacts on phone surveillance [63]. However, certain oversights made by the Singaporean government led to a surge of COVID-19 cases in Singapore; as of May 8, 2020, the total number of COVID-19 cases stands at 21,707 and the death toll stands at 20, making Singapore one of the worst hit countries in Asia [64]. Singaporean leaders ignored the risk posed by densely populated dormitories, housing low-paid migrant workers, where up to 20 workers live in one room and hence acted as a breeding ground for the virus. Although this oversight made by the Singaporean government led to a surge in COVID-19 cases, Singapore continues to marginalise these workers; this is highlighted by how the Singaporean Ministry of Health (MOH) splits the daily reports of the number of cases in to cases in the community, cases among work permit holders who do not live in dormitories and cases among work permit holders who live in dormitories [65].
- **Leading by example -** Leadership in the UK was challenged as several government officials and chief medical advisors [66] failed to 'lead by example' with some being forced to resign following criticism for breaking lockdown rules. Failing to maintain a consistent public health message triggered feelings of mistrust and loss of faith in leadership. In the US, an example of split messaging arose regarding face coverings; with the Centres for Disease Control and prevention (CDC) [67] urging the population to use them and President Donald Trump refusing to do so [68], this split messaging led to confusion and sparked fears around which precautions should be implemented.

  In the UK, calls have been made for focused public health messages with a central resource 'hub' where common questions could be curated and high quality information could be housed. With such platforms, government and public health messages would be transmitted clearly and accurately, limiting the amount of ambiguity around guidance.

4. Conclusion

The COVID-19 pandemic continues to cause worldwide turmoil across all aspects of life. In response, current global leaders have taken to numerous 'best practice' models and leadership strategies, aiming to achieve rapid situation monitoring, viral mitigation and containment, and the appropriate and adequate delegation of funds to areas of most need. Moreover, such strategies have highlighted the importance of being mindful of the ethical dilemmas that may arise. It is now clear that exemplar leadership requires an amalgamation of characteristic traits and unified actions capable of achieving an effective response nationwide. In particular, compassionate, open, and highly communicative leaders foster a sense of purpose that can act to strengthen a unified public health approach. The energy, focus, and resilience of a leader also becomes a precious commodity. During times of unprecedented crisis, embracing adaptive capacity in evidence-based strategies can help to establish long-standing resilience in the face of COVID-19.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Data statement

The data in this review is not sensitive in nature and is accessible in the public domain. The data is therefore available and not of a confidential nature.

Ethical approval

No ethical approval required.

Sources of funding

No funding received.

Author contribution

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Declaration of competing interest

No conflicts of interest.

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