How to Cite:
Sharma, S., Gomes, J., Sarkar, S., Chakraborty, A., & Kumar, S. (2022). Analyzing the effective healthcare management model for a COVID-19 pandemic: A suggestive study. *International Journal of Health Sciences*, *6*(S3), 6245–6266.
https://doi.org/10.53730/ijhs.v6nS3.7380

Analyzing the effective healthcare management model for a COVID-19 pandemic- A suggestive study

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***Abstract*---**COVID-19's global pandemic created a situation in which healthcare resources such as diagnostic kits, medications, and basic healthcare infrastructure were in short supply throughout the period, resulting in a detrimental impact on the socio-economic system. In a pandemic crisis, standardized public healthcare models were lacking, spanning everything from hospitalized patient care to local resident healthcare management in terms of monitoring, assessment, diagnosis, and medicines. The goal of this exploratory and intervention-based study is to propose a COVID-19 Care Management Model that represents complete care for society, encompassing patients (with COVID-19 and other disorders) and healthy people, within an integrated framework of healthier management. Better COVID-19 preventive and care outcomes can be achieved by shifting policies toward technology-oriented models with well-aligned infrastructure. The planned development of technical healthcare models for prognosis and improved treatment outcomes that consider

Manuscript submitted: 9 March 2022, Manuscript revised: 18 April 2022, Accepted for publication: 1 May 2022

not only genomics, proteomics, nanotechnology, and materials science perspectives, but also the potential contribution of advanced digital technologies, is one of the best strategies for early diagnosis and infection control. In light of the present epidemic, a Healthier Healthcare Management Model is recommended as a source of standardized care that includes technical assistance, medical consultation, and public health models of sanitization, distancing, and contact-free behaviors. Positive activity in designated research, technology, and management segments, more specifically public health, patient health, technology selection, and political influence, has considerable potential to boost the worldwide response to COVID-19. Such approaches will result in effective diagnostic and control systems, as well as a healthy society.

***Keywords*---**healthcare management, COVID-19 pandemic, suggestive study.

Introduction

SARS (severe acute respiratory syndrome), MERS (Middle East respiratory syndrome), Ebola, Zika viruses, H1N1 influenza, and chikungunya infections are all emerging and re-emerging infectious illnesses that have become a major source of mortality and morbidity around the world [1]. SARS Co-2, also known as COVID-19, poses an unpredictable hazard and challenge to the global society, as well as a detrimental economic and public health impact [2]. The recent COVID-19 virus infection pandemic has highlighted the value of community knowledge, practices, and attitudes during disease outbreaks [3,4]. COVID-19, a viral disease that has spread across all continents in a short period of time, has posed a significant challenge to public health paradigms. The current healthcare control techniques are under scrutiny due to the current global epidemiological situation. The ongoing attempts to improve healthcare facilities differ from country to country. The current pandemic scenario has brought to light a number of flaws in public health practices, as well as the necessity for technology-based remedies [5,6]. Through the study of pathogen geographical variation, disease clinical features, containment regions, asymptomatic persons, pathogen adaptability, and host vulnerability, WHO and native country health organizations may consider novel preventative policies. This data can be utilized to improve preventive efforts and aid policy adoption by determining the true impact of difficulties.

Understanding sophisticated technologies such as IoT, AI, Cloud Computing, and mathematical modeling, as well as the rapid pace of nanotechnology and genomics-based research, will produce better outcomes and aid in the development of effective control measures for better future prospects. Integration of the top three protective practices of distance, sanitization, and contactless procedures will improve healthcare outcomes. More patient monitoring and biomedical research procedures contribute to a higher likelihood of prognosis adherence. The preventative healthcare approach is identified based on the importance of three key hazards: transmission possibility, social distancing, and

sanitized environment, ensuring substantial control of COVID-19 dangers at a low cost. Following the COVID-19 pandemic, public healthcare is now one of the top objectives, with community healthcare needs being monitored and met solely through better management. Integrated approaches to structured management and technology-based solutions, on the other hand, offer the ability to supply mass healthcare services in a sustainable manner. As a result, for efficient healthcare services and improved control results, this article stresses and promotes multidisciplinary research, technology adaptation, and structured healthcare management. Understanding trio models and implementing the proposed healthcare model will aid in social distancing, a sustainable sanitized system, and a healthy environment, all of which are important for protecting humans and increasing equity of access to high-end technologies based on multidisciplinary research for a better prognosis system. This review elaborates on the significance of the following three segments to better comprehend the value of multidisciplinary research, technological requirements, and management adaption for a better prognostic model.

- In the prioritized segment, multidisciplinary research
- Structured healthcare management
- Technology-driven healthcare models

Multidisciplinary research in a high-priority area

Biological, medical, engineering, chemical, and physical sciences research data can yield a wealth of knowledge for translational research. For any prognostic model, understanding epidemiology, pathogen variants, clinical aspects, and human susceptibility should be a priority area of science and technology. Based on logical answers for public healthcare models, the areas listed below should be favored.

- Database resource research
- Treatment and vaccine development
- Modification of previous infectious illness prognosis models

Database resources for research

This will aid in the correlation and understanding of any possible low and high illness severity. Various databases are available online, which can be used to track trends throughout time. Cross-checking WHO, Scopus, PubMed, ICMR, CDC, and other multidisciplinary resources can help with future policy planning. Important items were included to help people become more aware of good public health literature and resources [7]. The role of genomes and proteomics in framing prognosis to treatment was heavily predicated on such interpretation, analysis, and findings. The regional healthcare protection model should be based on a risk assessment of the region. The best lead is to review, design, and implement effective control measures for regional healthcare models using a diversified strategy to avoid any specific risk. Due to open resources and access to diverse knowledge databases, all scientific information can be understood. Many publishers make their resources freely and temporarily available during an epidemic [8]. This allows for considerably faster adoption of technology and

innovative research. Data analytics has the ability to help us better understand the method of transmission and make more protective measures in the event of an outbreak. Breaking the transmission chain is the most critical aspect of protection.

Vaccination and treatment

Antibiotic-resistant bacteria are on the rise worldwide, and antiviral medications are in short supply, posing a serious threat to new bacterial and viral illnesses. COVID-19 therapy has seen good results in a recent study [9]. There are no effective and acceptable medications for the treatment of COVID-19, so other disease treatments and drug combinations have emerged as the best therapy method. Remdesivir, interferon-1a, the antiviral combination lopinavir/ritonavir, the antimalarial chloroquine/hydroxychloroquine, and monoclonal antibodies against immune system components such as interleukin-6 (IL-6) and IL-4 are currently undergoing clinical trials to assess their safety and efficacy for effective COVID-19 treatments [6,10]. The study confirmed that vaccines reduce disease rates in infectious diseases caused by viruses (such as HIV/AIDS, hepatitis C, and others), bacteria (tuberculosis (TB), protozoa (malaria and neglected tropical diseases (NTDs), and others). COVID-19 increases the chance of death far more quickly than other infectious diseases. A big global effort is underway to produce numerous COVID-19 vaccines through clinical trials at various stages [11]. Furthermore, due to a lack of disease mechanism information and, as a result, the lack of effective treatments and vaccinations, the death rate is uncontrollable.

Adaptation of other prognostic models for infectious diseases

Emerging infectious dangers necessitated the adoption of a shared policy for early detection, treatment, and control of various concerns. For better response in the event of an outbreak, a study on various infectious pathogens (viruses, bacteria, protozoa, and so on) and their better control models should be incorporated into the COVID-19 prognostic model. The death of thousands of children, particularly in African countries, is worrying, according to the WHO report on malaria (WHO-2014) [12]. Treatment requires an understanding of the drug's functionality. It's worth noting that only trans atovaquone is useful against malaria, while its cis isomer isn't [13]. The malaria medicine choro quinine, also known as hydroxychloroquine, is being used to treat COVID-19. The SARS coronavirus (discovered in 2002) was extensively examined by Nicol and his team, and based on their findings, they proposed that SARS be treated with chloroquine or, better yet, hydroxy-chloride quinine, as published in the virology journal in 2005 [14].

WHO established a new effort dubbed T3: Test. Treat. Track. on World Malaria Day 2012 to create a framework for endemic countries to promote malaria control and elimination [15]. Control management plans for infectious disease adoption, diagnostic testing, treatment, and tracking were launched on a regional basis for successful control. The establishment of an effective public health management policy that incorporates the most effective medical countermeasures (e.g., vaccines, diagnostics, and medicines) is beneficial in reducing illness occurrence. Most models predicting the severity and mortality of malaria infection lack

generalizability due to a lack of external validation [16]. Overall, a study into malaria and COVID-19 disease can lead to a better control strategy [14–16].

Understanding the HIV prognostic model, another lethal disease

The diagnosis model for COVID-19 must be easy to understand. In the case of HIV, plasma HIV-1 viral load measures, both alone and in combination with CD4+ cell counts, offered excellent predictive information for progression to AIDS and death in a specific group [17]. According to studies, universal HIV therapy would be the most effective and efficient way to lower the HIV burden and improve public health [18]. To understand the global asymptotically level, numerical simulations are done in a unique HIV/AIDS pandemic model [19]. Understanding the severity of diseases by risk groups (low, middle, and high) and using the nomogram to make an accurate and favorable prognostic prediction for ART treatment in HIV would be extremely beneficial in terms of cost-effectiveness [20]. Studies suggest that better integration of modeling in decision-making can be achieved by systematically reporting on the evidence synthesis process, as well as the quality of data entered into the model [21]. Dynamic HIV transmission models can provide evidence-based guidance on how to treat and prevent HIV.

Clinical consequences are one of the primary aspects of COVID-19, where symptoms range from symptomatic to asymptomatic. A compartmental model, which describes a population divided into mutually exclusive health states and uses differential equations to represent the mechanisms of transition between infection, rapid progression, reactivation, and treatment/recovery health states, is a common modeling approach for tuberculosis [22]. Understanding disease progression and transmission based on host susceptibility is a key part of COVID-19 since illness severity can be predicted ahead of time for control methods. To explore the influence of transmission, severity, and therapy, a novel mathematical model that distinguishes between susceptibility among the population for tuberculosis based on genes is useful [23].

Models of healthcare based on technology

Technologies have the ability to significantly speed up epidemic management and reduce the disease burden. Various public health model adaptations for better healthcare management must follow disease-specific patterns. Testing, shared analysis, validation, implementation, and evaluation are all part of the policy creation process for healthcare technologies with the involvement of many stakeholder groups [24]. The use of GIS, information technology, computational analytics, and mathematical modeling to improve decision-oriented processes can save lives and reduce public-sector economic losses. Pre-incident information can aid in the implementation of prevention policies. The aforementioned policy will establish a protection regimen and aid in the fight against such fatal and highly infectious diseases. For cost-effectiveness and superior results, the healthcare industry has recently moved toward technology-based applications. As we struggle to keep healthcare quality high while keeping prices low, the study reveals that economy and policy influence healthcare technology solutions [25]. Healthcare technologies demonstrate quality, accessibility, and cost-effectiveness on a large scale, affecting individual budgets significantly. In the national interest,

the government must adopt a beneficial policy for patients based on provider benefit, quality, and outreach assessment. The subheadings below were a focused area of research and technology for the COVID-19 pandemic and may address better healthcare technologies.

- Mathematical modeling
- Disease surveillance
- Nanotechnology's role in improving prognostic models
- Materials industry and biosensor-based technology
- Digital healthcare technologies for the general public

Modeling in mathematics

One of the most difficult aspects of infectious diseases is disease transmission. Through algorithms, mathematical programs may anticipate, segregate, and define the most appropriate conditions for virus propagation in small locations or large groups. Mathematical science helps to operate the control and other awareness programs by understanding super-spreaders issues, and population subgroups of high danger and low risk. According to the findings, mathematical models can forecast epidemic curves, which depict the number of infections produced by a virus over time [26]. Another set of numerical simulations shows that the proposed disease model is appropriate for the epidemic in Wuhan, China [27]. Integration of such algorithms in integrated systems, where we can acquire possible illness spread forecasting in advance merely by entering data. This information will aid in the establishment of public awareness prevention efforts.

Diseases surveillance

For the early detection of infectious hazards, population demography (density, mode of transportation, market locations, etc.) and ecological factors (climate change, agriculture, etc.) are critical. To control any potential disease threats, accurate monitoring of infectious diseases using pathogen biology information should be coupled with surveillance tools focused on risk assessment of any sudden outbreaks [6]. The WHO produced COVID-19 materials, which underline the importance of adapting and strengthening current national systems, as well as scaling up monitoring capabilities [28]. The National Notifiable Diseases Surveillance System (NNDSS) in the United States gathers and provides data on COVID-19 cases to the Centers for Disease Control and Prevention (CDC) [29]. Surveillance, according to the study, aids epidemiologists in calculating: Incidence (number of new cases reported over a specific period of time), Prevalence (number of cases at a single point in time), Hospitalizations (number of cases resulting in hospitalization), and Deaths (number of cases resulting in death), as well as other disease-related data [29]. One of the most important requirements in the current corona crisis is to use technology-based surveillance to monitor the top three preventive measures, such as mask, sanitization, and distance of COVID-19 in the community. It's also crucial to connect human activity to regional disease epidemics. Because human behaviors and attitudes are tracked using epidemic intelligence approaches, and progress is being made toward improved public health control models for long-term solutions.

Nanotechnology's role in improving prognostic models

Contagious diseases have shaped human history and continue to do so even in the twenty-first century's technological development. The crown-shaped virus with nano dimensions seen under an electron microscope is so novel that many questions remain regarding its origin and transmission—how readily it spreads, how it invades the body, how the immune system reacts, and how deadly it is. Nanotechnologies will have ultimate solutions because they will be with us as the weather changes, but until then, proactive precautionary steps will suffice. While working on a diagnostic device that consists of coated antibodies, scientists must attack Covid-19 from a variety of perspectives. This is how nanotechnology aids in speedier diagnosis by binding to a specific viral protein while a second antibody is coupled to gold nanoparticles or another nanomaterial. Modeling infectious illness dynamics and transmission of COVID-19 is vital for developing hygiene techniques and preventing infectious droplets, according to the research. For better illness outcomes, researchers must focus their efforts on the design and evaluation of nanotechnology-based drug delivery systems, the pharmacology of delivered medications, and the (patho-) physiology of the host [30]. According to the viewpoint study, bio-nanotechnology can manage COVID-19 in a tailored way [31]. Kostas Kostarelos discusses how the nanoscience community might participate in the fight against COVID-19 by using scientific evidence [32]. Hopefully, a COVID-19 vaccination based on nanoparticles will be available on the market soon. Medical needs continue to push scientists to develop new technological solutions, many of which involve improving material functionality. The most promising materials opportunities are at the crossroads of conventional study fields like materials science and biology. However, scientists from all fields, as well as students, should step forward to find novel answers to this fast-moving beast.

The materials industry and biosensor-based technology

The advantages of biosensor-based technology in the biomedical field are rapid reaction times and real-time monitoring of biological processes, which can aid in mass community point-of-care measures. Studies on antibodies, DNA molecules, and enzymes are being conducted in order to build biosensors that use graphene and its derivatives to detect infections and biomolecules connected to diseases [33]. According to a recent study, a dual-functional LSPR biosensor with a lower detection limit of 0.22 pM can detect selected SARS-CoV-2 sequences with great sensitivity [34]. Unique world-class metal environmental dissolving technology and colloidal metal nanoparticle synthesis technology are urgently needed. There is a demand for diverse kinds of spherical nanoparticle colloidal solutions by adopting a single production process, from raw materials to nanometal and nano metal oxide production [35]. The recent development of effective anti-covid-19 virus components in TPNT is a sign of hope for the next level of technology in COVID-19 care [35]:

- The TPNT1 nanocomposite colloidal solution, which is now in the application product development stage, successfully destroyed the COVID-19 virus in a test conducted by National Taiwan University.

- Assay for lateral flow: Different hues of nanoparticles, such as AuNPs (red), PtNPs (black), SeNPs (orange), Au/PtNPs (purple), Au/ZrO2 (deep red), have already been developed using the principle of conjugation nanoparticles with antibodies and antigens.
- Environmental disinfection: A nanoparticle composite colloidal solution known as ND50 can be utilized to successfully disinfect the environment against COVID-19. Tripod NanoTech Can Assist You! For COVID-19 epidemic prevention, nano metal/metal oxide is an effective option [36].

After the COVID-19 pandemic, the most important challenge is to understand the numerous perspectives for the development of novel point of care (POC) diagnostics for cost-effective public healthcare. These POC biosensors, which are made of polydimethylsiloxane (PDMS), papers, and flexible materials (textile, film, and carbon nanosheets), have advantages, problems, and future prospects for controlling COVID-19 spread [37]. Biosafety materials should be the primary focus of materials science research [38]. The harmful effects of coronavirus have driven the development of new materials to combat the disease more quickly around the world.

Digital healthcare technologies for the general public

During pandemics, large-scale community services are essential, and a variety of new-age technologies can help. Supportive clinical care, combined with cutting-edge technologies such as IoT, surveillance, sensors, cloud-based support systems, artificial intelligence, machine learning, and nanotechnology, maybe the most practical instruments for making decisions in emergency situations. [6]. Every day, the digital health industry focuses on the diagnosis, prevention, and management [39]. This pandemic has sparked an unprecedented need for digital health technology, which includes healthcare solutions including population screening, infection tracking, and tailored response design [40]. Artificial intelligence has been used in a number of applications in the field of infectious illnesses, particularly in low-income nations [41]. Through translational research initiatives integrating artificial intelligence and mobile technology, a hospital technology business is dedicated to a mass health-care mission for regional COVID-19 [42]. To combat the COVID-19 pandemic, WHO has received overwhelming cooperation from healthcare technology organizations. 30 of the world's finest digital technology professionals convened in a virtual roundtable on April 2, 2020, to help promote WHO's a collaborative response to COVID-19 [39]. Epidemiological modeling can be used to anticipate illness transmission dynamics and hence help decrease pandemic risk. Improving public health decision-making requires interdisciplinary collaboration among empiricists, politicians, and technological businesses [43].

Healthcare administration with structure

With minor modifications and adjustments in strategy based on geographical information or the nature of the disease, a successful public health model can be used for any infectious disease outbreaks. During pandemics, the community's awareness and people's actions have an impact on transmissions. As a result, involving the general people in awareness efforts is the ideal strategy. The rate of

outbreaks is slowed by effective public health management (e.g., case tracing, outbreak investigations, and social distancing). For healthcare personnel with conventional training and knowledge, identifying measures to minimize the spread of COVID-19 is critical [44].

Early detection, better prevention, and complete treatment with high potential in a cost-efficient manner are all benefits of an effective public health policy. Preventive policies must incorporate research and technology at the community level to cover healthcare solutions for all members of society to have varying degrees of influence on public policy formation and implementation. As a result, proof of efficacy for various segments may be addressed by the management of the public health model, with a focus on specific and regional management models. In pandemic crises, structured management with integrated technological techniques that provide logical and cost-effective solutions [Table] is more useful. The management categories listed below are beneficial to healthcare effectiveness and societal health.

- Management of public health
- Management of patient care
- Healthcare technology
- Information resources
- Political effect

Table 1
Management type categories, technology, information resources, and political impact of COVID-19

Management type	Description	Reference
Discover value-based health: a new paradigm for healthcare		[45]
Healthcare workers exposed to COVID-19		[46]
CDNA guidelines for the prevention, and control in Australia		[47]
Management of the COVID-19 by public health establishments		[48]
Public health management		
Patient care management		
Healthcare technology		
Information resources		
Political impact		
Maternal health care management during the COVID-19		[49]
Hospital medicine management in the Time of COVID-19		[50]
Adaptations and lessons from COVID-19 in industries		[51]
Commercial health plans for populations and personalized care		[52]
Global policy and agenda		[53]
Pathophysiology, epidemiology, and clinical management		[54]
Healthcare cloud services		[55]
COVID-19, technical guidance & patient management		[56]
Guidance on testing		[57]
Contact tracing of persons exposed to COVID-19 cases		[58]
Medical management of COVID-19		[59]
Intensive care management of coronavirus disease 2019		[60]
Health information		[61]
Transformational healthcare outcomes		[62]

Managing healthcare delivery system and experience in Japan	[63]
Propeller sensors track medication	[64]
Monitoring approaches for healthcare workers	[65]
Covid-19 and health care's digital revolution	[66]
Smart healthcare: making medical care more intelligent	[67]
Source of knowledge	[68]
Source of knowledge	[69]
Call for papers on management science in the COVID-19	[70]
IPR and patents in COVID-19	[71]
Political and crisis communication	[72]
Politics, trust, and behaviors	[73]
Economic, social, and political issues	[74]
Policy sciences: initial reactions and perspectives	[75]

Management of public health

A strong public health strategy focuses on describing rapid detection and successful control plans that adhere to specific principles while keeping a regional viewpoint in mind. Quantification of viral loads, antigens, and antibodies in the human body can provide insight into infection progression as well as information about COVID-19 full-positive circumstances in vulnerable areas. It's crucial to understand how we do risk assessments, COVID-19 diagnoses, and control as part of public health management during a pandemic. The relevance of COVID-19 management is illustrated in the Table [45–54]. Value-based health, country guidelines, public health establishment, medicine management, and industry adaption are all vital to understanding in order to make better management plans [45,47,48,50,51]. We must focus on other risk concerns like healthcare professionals, maternal difficulties, complicated disorders under epidemiology, and defined clinical setup in advance when building healthcare policy and agenda for customized and population levels [46,49,52,46–54]. The criteria listed below, as well as the Table [45–54], define a better path for the targeted region their contamination Early detection through diagnosis aids in the control of patients whose infections were discovered early. Some people may unintentionally infect their close relatives, acquaintances, and others in society. As a result, early diagnosis benefits not only the individual but also society. Prompt control allows for the prevention of further infection and risk reduction through a sanitary environment and treatments that aid in the lowering of viral load in the human body. The justification for community-wide screening to identify COVID-19 patients is critical for launching control programs for negative people ahead of time. The most crucial step in screening is to identify people with immunodeficiencies or other diseases, as well as elderly people with a clinical history of other diseases, because the presence of such clinical signs may predispose them to opportunistic pandemic disease infections in the future. Rapid screening tests at the community level aid in making quick decisions for better public health management. These point-of-care settings technically speak of positive and negative pathogen exposure.

Screening's importance and cost-effective policy

During a pandemic, population screening is critical for making decisions about how to avoid a high risk of COVID-19 infection. If we wait too long to test, there's

a danger we'll be exposed to COVID-19. It is preferable to be always negative for COVID-19 infection in order to encourage earlier testing. The economic expenses of public healthcare management are important for providing healthcare to the general public. In terms of community utility for diagnosis, treatment, and control, a complete public health approach with lower costs is extremely important. Currently, technology-based healthcare management has been found to be effective in lowering costs and increasing service delivery.

Patient care administration

COVID-19 exposure and transmission have increased significantly globally since the year 2020. Management should focus on COVID-19 risk behaviors, control mechanisms, and treatment techniques to ensure timely access to care for patients with COVID-19 infection. The majority of patients who are aware of their clinical status and have access to a medical facility where they can self-treat are given first attention. Continuous monitoring of clinical state and provision of medications is a better hindrance to successful preventative tactics for patients. On the other hand, all healthy people are in close contact with the patient, have received medical counseling, and have prevention tools. The second critical step is to adopt preventive steps to prevent COVID-19 from spreading to other people. Because COVID-19 is extremely infectious, patient care is crucial in its management, with patients being isolated and treated appropriately. The Table [55–60] illustrates the significance of patient-care management and its role in promoting a healthier environment. Patient monitoring and follow-up using technology-based cloud service management under clinical supervision is beneficial to patient care [55,56]. During the COVID-19 pandemic, it is critical to separate patients into three groups: sick, healthy, and asymptomatic, and to follow up on those who have been exposed [57–59]. Through a defined clinical management protocol, medical and intensive care management for diagnosis, isolation, and infection control is required for healthcare workers and other patients [59,60]. The future of patient healthcare is a comprehensive diagnosis and treatment package that includes all risk data, contact information, follow-up, clinical history, status improvement, potential risk, and cost-effectiveness. As a result, it isn't possible.

- Important research policies
- Screening for COVID-19 using fast testing
- The significance of screening and cost-effective policy

Important research policies

The implications of advanced public health settings and their impact on disease risk reduction must be addressed in key research policy. Identification and clarification of the COVID-19 biological research is always a critical point for diagnosis and pathogenesis. Disease transmission continues, thus study into diagnostic mechanisms and the development of effective medications is beneficial to health care policy. Disease modeling research based on data from regional micro epidemics provides a framework for developing a dynamic and compartmental virus transmission model [27]. In order to combat the Coronavirus pandemic, special attention must be paid to the integration of diagnosis and

control measures in healthcare management, where affected people are identified and treated. In this case, public health policy entails (a) surveillance and diagnosis, as well as (b) screening and control mechanisms inappropriate public health settings.

Screening for COVID-19

Individuals who are unaware of their infection require diagnostic services at the community level as part of the public health system. Early detection through diagnosis aids in the control of patients whose infections were discovered early. Some people may unintentionally infect their close relatives, acquaintances, and others in society. As a result, early diagnosis is beneficial not just to the person but also to society. Prompt control allows for the prevention of further infection and risk reduction through a sanitary environment and treatments that aid in the lowering of viral load in the human body. The justification for community-wide screening to identify COVID-19 patients is critical for launching control programs for negative people ahead of time. The most crucial step in screening is to identify people with immunodeficiencies or other diseases, as well as elderly people with a clinical history of other diseases, because the presence of such clinical signs may predispose them to opportunistic pandemic disease infections in the future. Rapid screening tests at the community level aid in making quick decisions for better public health management. These point-of-care settings technically speak of positive and negative pathogen exposure.

Screening's importance and cost-effective policy

In the event of a pandemic, community screening is critical in order to make an informed decision about whether or not to risk infection with COVID-19. If we wait too long to test, there's a danger we'll be exposed to COVID-19. It is preferable to promote earlier testing if one wants to always be negative for COVID-19 infection. The financial costs of public healthcare management are important when it comes to providing healthcare to the general population. In terms of community utility for diagnosis, treatment, and control, a complete public health approach with lower costs is extremely important. Currently, technology-based healthcare management has been found to be beneficial in lowering costs and providing a wide range of services.

Management of patient care

COVID-19 exposure and transmission have increased significantly globally since 2020. Management should focus on COVID-19 risk behaviors, control mechanisms, and treatment techniques to guarantee timely access to care for a patient with COVID-19 infection. First attention is given to the majority of patients who are aware of their clinical status and have access to a medical institution where they can treat themselves. Continuous monitoring of clinical state and provision of medications is a better hindrance to successful preventative tactics for patients.

A second vital step is for all healthy people who come into close contact with the patient to receive medical advice and prevention tools in order to take

preventative measures to stop COVID-19 from spreading to others. Because COVID-19 is extremely infectious, patient care is crucial in its management, with patients being isolated and treated appropriately. The relevance of patient-care management and its role in establishing a healthier environment is illustrated in the Table [55–60]. Inpatient care benefits from patient monitoring and follow-up using technology-based cloud services management under professional supervision [55,56]. During the COVID-19 pandemic, segregation of patients, healthy and asymptomatic, based on clinical testing and follow-up of exposed persons is a critical task [57–59]. Through a defined clinical management strategy, medical and intensive care management for diagnosis, isolation, and infection control is required for healthcare personnel and other patients [59,60]. The future of patient healthcare is a comprehensive diagnosis and treatment package that includes all risk data, contact information, follow-up, clinical history, status improvement, potential risk, and cost-effectiveness. As a result, the importance of how patient care management is planned and fulfilled in a long-term therapy paradigm cannot be overstated.

Healthcare management and technology

In order to deliver public health models more efficiently, the future of healthcare lies in digital healthcare technologies such as the internet of things, artificial intelligence, nanotechnology, and so on. In a pandemic crisis like COVID-19, transforming the healthcare delivery system through the use of technology is the most crucial strategy. This transition will necessitate adjustments in the public health system to give both diagnosis and control setup systems through the use of valid clinical kits, medical specialists, evidence-based research on best practices, and a better patient outcome perspective. Healthcare technologies can play a big role in improving public health services from the perspective of mass healthcare and cost-effectiveness, as shown in the Table [61–67]. Understanding healthcare data and transformational results through regional healthcare models are critical for technology adoption [61–63]. The use of sensor-based technology in patient and healthcare professional monitoring has revolutionized healthcare management [64–66]. Experts in engineering, biotechnology, medical science, pharmacology, and chemical science assist the system, which works hand-in-hand with technology and healthcare to stay relevant in the current pandemic. In healthcare, technology has the potential to transform healthcare systems into more cost-effective, faster, and better solutions, as well as models that can help us win the war against disease. COVID-19. COVID-19 diagnostic gives infection information that aids in the early implementation of control strategies. Early diagnosis provides the foundation for community-based care, control, and treatment support for those in need. The medical healthcare field has been spurred by the current digital revolution, resulting in an intelligent and smart healthcare model for the public and community [66,67]. At the level of effective management in public health, embracing emerging technologies and their design and development according to current healthcare requirements in a cost-efficient manner should be promoted and supported.

Information management and resources

The current pandemic reflects the significance of implementing good public health policies in COVID-19. Based on publicly available information, there is a link between clinical practices, knowledge, technology advancements, research outputs, and treatment delivery. One could gain knowledge by using many resource centers for information on public healthcare procedures. Any relevant or related information, on the other hand, was compiled from a variety of reliable and trustworthy sources to help avoid any health risks. A universal data management system that systematically offers information under one canopy in comparing and assessment mode with reliable references is urgently needed right now. However, due to their complexity and lack of complete structure for all dimensions, current resources are unable to give systematic data. As a result, public health policymakers should emulate the experiences that the informants requested. The importance of resource and knowledge management in the COVID-19 problem is demonstrated in the Table and other sources [68–72]. The scientific community is active in COVID-19 research and technology development benefits from the collection of publications and other resources in one place, as well as an open single depository system for knowledge.

Through the utilization of health services and information, information and communication technologies simply contribute to better communities, where resource centers publish fresh research and findings on the key concerns of the public health problem. For a better knowledge of disease epidemiology and clinical practices, the universal model of resources should provide comprehensive and systematic information that considers all-important specificity. The global society benefits from understanding innovation and IPR knowledge and transforming it into a useful product [71]. Overall, political decisions based on epidemiological data have a significant impact on public life [72]. In this pandemic era, the importance of information management is reflected in the categories listed below.

- Informant and resource characteristics
- COVID-19 Treatment Resource Information
- COVID-19 Information and Prevention Resources

Informant and resource characteristics

Health-care professionals' wide investigation of information sources aids them in correlating outcomes and calculating knowledge scores for public health decisions. Furthermore, with more information about COVID-19 diagnosis, control, and therapy, healthcare professionals might rethink or change their therapeutic decisions. For improved healthcare management, the government authority evaluates and revises clinical management on a regular basis. The COVID-19 pandemic informants should provide an overview of the complete clinical process throughout treatment as well as disease containment efforts.

Resources for COVID-19 therapy information

Valid organizations' treatment information and drug trial reports are included in the authenticate list. All minor details for the effectiveness of therapy in reducing risk should be provided on websites, with further contact information for counseling and referrals to providers. Valid public health information on treatment is useful for making community-wide decisions.

COVID-19 prevention and resource information

The current pandemic environment demonstrates the efficacy of control in limiting transmission through the use of effective preventative mechanisms and technology. Surveillance and epidemiology data are the most helpful information sources for prevention since they aid in the development of more efficient COVID-19 disease control techniques. For the sake of legitimacy, health professionals who provide services in disease prevention at the community level should be mentioned in index journals and organization indexes at the national level.

Political ramifications

The fundamental driver of any country's healthcare system is political leadership. Political action is based on government leaders who influence appropriate healthcare initiatives, such as COVID-the 19 pandemics. Through policy, political governments have the ability to develop or improve public health. In all circumstances, ignorance has a stronger influence on illness incidence as a disease connected with the transmission, insufficient diagnosis, unsuitable treatment facility, infectious disease control system, and so on. Politics is critical in delivering a better prognosis ideology since best practice is the determinant of effective implementation. The relevance of political impact in public health management is highlighted in the Table and references [73–75]. COVID-19 has also had a significant impact on the global economy and financial markets, causing income crises, unemployment, and disruptions in transportation and industry in many nations [73]. As a result, governments should take prompt action to safeguard financial prosperity.

The regulation's commitment to addressing risk groups regardless of socioeconomic affiliations is reflected in appropriate preventative policies and activities. In order to stop the spread of pandemics and protect an individual and their community, unprecedented levels of resources have been deployed for public health access. Government and public officials choose prevention approaches with careful consideration, direct involvement, recommendations, and participation in public health management actions. When a pandemic strikes, the country's political leadership can conduct health campaigns, public testing, and voluntary control through treatment at free government facilities. Accepting and recommending healthcare policies based on modes of transmission, impacted populations, and geographical incidences is the responsibility of the country's political leader. The fact and relevance of better political decisions for public health were established by the economic crisis and recession caused by COVID-19. The socio-economic repercussions of COVID-19 global outbreaks include

social separation, travel limitations, a closed industry, and the loss of the food sector and schools [74].

According to international legislation, regional public health models, and evidence under epidemic or endemic circumstances, policymakers can offer a variety of approaches. The study emphasizes the necessity of public trust in government choices and actions related to COVID-19 management as a key global concern [75]. The COVID-19 epidemic has produced economic, social, and political challenges that must be addressed with proper legislation; otherwise, a lack of understanding will lead to complications [76]. The study investigates how scientific and technical competence, emotions, and narratives impact policy decisions and connections between citizens, organizations, and governments [77]. Understanding adaptation, policy responses, network changes (locally and globally), and evaluating policy success and failure in terms of many areas of policy sciences should all be given priority [77]. Political decisions affecting public health management guarantee that the right mechanisms are in place to monitor and assess data about pandemic disease, and that all risk factors that could increase COVID- 19 prevalence are under control. Overall, political law and its impact on public health policy are driven by social, legal, and economic analyses for a healthy society.

Interpretation and regional healthcare models offered

Improved translational research findings for clinical practice can be interpreted in terms of effectiveness, cost, new development, and the concept of improvement through socially desirable innovations [78]. The greatest solution for any pandemic-like crisis is to address the flaws in public health models and counterbalance them with new healthcare technologies. The usual interpretation expands the scope of public policy to include technological evaluation (finding flaws, benefits, and costs of new advancements) [78]. On the same line will be the use of genomes and proteomics research for diagnosis, medications, and vaccines, as well as AI, IoT, Electronics, and Cloud computing models for preventive techniques [6]. Healthcare facility demand is strong in a pandemic situation, but technological transformation toward organized management and an integrated technology environment is slow. We propose regional healthcare models based on the prioritization of three key risks: the likelihood of transmission, social isolation, and a sterilized environment. Controlling all three key risks will effectively prohibit COVID-19 from spreading. Behavior determines how preventive measures are handled, whereas attitude toward the top three precautionary measures determines how disease spreads in the community.

In addition to preventative measurements, systematic and specific healthcare management is essential to obtaining successful prognostic outcomes (Table). Multidisciplinary research and modern technology models can help bring the prognostic strategy forward. In disease-drug-based research, genomics, proteomics, clinical research, and nanotechnology will be useful, while biosensor technologies will be useful in diagnosis-based procedures. Multidisciplinary research, advanced technology, and structured healthcare management are all used in an effective prognosis strategy to battle COVID-19 disease. Furthermore, we must comprehend key signatures, signals, and findings from different studies

that documented various healthcare management solutions (Table). Understanding various healthcare models and their research is critical because it will aid in the development of methods for dealing with complex and changeable hazards. Advanced healthcare technologies and biomedical research data should be used to improve public health and patient care management (Table). These many management studies can be adapted to the COVID-19 risk assessment and the effectiveness findings can be analyzed from time to time for a better decision. As a result, technology-oriented public healthcare models should be able to acquire more effective healthcare management for regional healthcare practices with a high rate of success, characterized by decreased risk and cost-effective treatment. All of the previously indicated, adopted, and integrated control approaches will help to prevent disease spread more effectively. This paper focuses on adapting the best healthcare management techniques across continents based on different disease models, modern technologies, and COVID-19 transdisciplinary research experiences.

Conclusion and possibilities for the future

In the proposed organized framework of management, this article provides an overview of the prognosis and preventive issues that must be addressed in advance to battle pandemic-like circumstances. In order to develop a preventative model, it is important to identify many local clinical aspects and transmission possibilities related to behavioral interventions in an outbreak zone. Effective treatments in a public health paradigm using modern technology can have significant positive health and socioeconomic repercussions. We can prevent the spread of infectious diseases by following a consistent healthcare policy and taking the necessary safeguards. Although n order to decrease the global occurrence of the disease, improved healthcare management preparedness is required, the data offered in this study will be useful to stakeholders in shaping policy, research, and technology for better public health management. Technology, analytics, artificial intelligence, and clinical information systems are advancing healthcare services, which deal with high-end professionals on one side and intellectual clients on the other. Novel biomarkers, intelligent medicines, and quality care strategies are significantly reliant on the fast transformation of the healthcare system through a strong policy of technology-enabled structured healthcare management in the futuristic sustainable model of healthier outcomes.

References

1. Bloom David E, Cadarette Daniel. Infectious disease threats in the twenty-first century: strengthening the global response. Front Immunol 2019;10:549.
2. Nicola Maria, Alsafi Zaid, Sohrabi Catrin, Kerwan Ahmed, Al-Jabir Ahmed, Iosifidis Christos, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): a review. Int J Surg 2020;78(June):185–93.
3. Hadil Alahdal, Fatemah Basingab, Reem Alotaibi. An analytical study on the awareness, attitude and practice during the COVID-19 pandemic in Riyadh, Saudi Arabia. https://doi.org/10.1016/j.jiph.2020.06.015.
4. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during

the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. Int J Biol Sci 2020;16(10):1745–52, http://dx.doi.org/10.7150/ijbs.45221.
5. Fegert JM, Vitiello B, Plener PL, Clemens V, et al. Challenges and burden of the coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. Child Adolesc Psychiatry Ment Health 2020;14:20, http://dx.doi.org/10.1186/s13034-020-00329-3.
6. Mishra A, Patra S, Shukla SK, Pandey P, Shukla Y, Osmera P, et al. Current sce- nario of coronavirus pandemic. Adv Mater Lett 2020;11(4):20041494, http:// dx.doi.org/10.5185/amlett.2020.041494.
7. COVID-19 Databases and Journals: https://www.cdc.gov/library/researchguides/2019novelcoronavirus/databasesjournals.html.
8. Freely available COVID-19 resources:https://library.maastrichtuniversity.nl/collections/databases/free-access-to-resources-during-the-covid-19/.
9. COVID research updates: https://www.nature.com/articles/d41586-020-00502-w.
10. Vaccines and treatment of COVID-19: https://www.ecdc.europa.eu/en/covid- 19/latest-evidence/vaccines-and-treatment.
11. World Health Organisation (WHO), Available from: Clinical management of COVID-19. Interim guidance. WHO; 2020 https://www.who.int/publications/i/ item/clinical-management-ofcovid-19.
12. WHO World Malaria Report 2014, http://www.who.int/malaria/publications/ world malaria report 2014/wmr-2014-foreword.
13. Basumallic S, Guru Row TN. Binding study of cis atovaquone with cytochrome bc1 of yeast. Comput Mol Biosci 2015;5:57–63.
14. J.Vincent M, Bergeron E, Benjannet S, Erickson B, Rollin P, Ksiazek T, et al. Chloro- quinine is a potent inhibitor of SARS chrona virous infection and itsspread. Virol J 2005;2:69–79.
15. https://www.who.int/malaria/areas/test treat track/en/.
16. Njim T, Tanyitiku BS. Prognostic models for the clinical management of malaria and its complications: a systematic review. BMJ Open 2019;9(11):e030793, http://dx.doi.org/10.1136/bmjopen-2019-030793. Published 2019 November 26.
17. Vlahov D, Graham N, Hoover D, Flynn C, Bartlett JG, Margolick JB, et al. Prognos- tic indicators for AIDS and infectious disease death in HIV-infected injection drug users: plasma viral load and CD4+ cell count. JAMA 1998;279(January (1)):35–40, http://dx.doi.org/10.1001/jama.279.1.35. PMID: 9424041.
18. Ross JM, Ying R, Celum CL, Baeten JM, Thomas KK, Murnane PM, et al. Modeling HIV disease progression and transmission at population-level: the potential impact of modifying disease progression in HIV treatment programs. Epidemics 2018;23:34–41, http://dx.doi.org/10.1016/j.epidem.2017.12.001.
19. Huo Hai-Feng, Chen Rui, Wang Xun-Yang. Modelling and stability of HIV/AIDS epidemic model with treatment. Appl Math Model 2016;13(40):6550–9.
20. Hou X, Wang D, Zuo J, Li J, Wang T, Guo C, et al. Development and validation of a prognostic nomogram for HIV/AIDS patients who underwent

antiretroviral therapy: data from a China population-based cohort. Lancet 2019;48:414–24.
21. Krebs E, Enns B, Wang L, Zang X, Panagiotoglou D, Del Rio C, et al. Developing a dynamic HIV transmission model for 6 U.S. cities: an evidence synthesis. PLoS One 2019;14(5):e0217559, http://dx.doi.org/10.1371/journal.pone.0217559.
22. Dowdy DW, Dye C, Cohen T. Data needs for evidence-based decisions: a tuber- culosis modeler's 'wish list'. Int J Tuberc Lung Dis 2013;17(7):866–77, http:// dx.doi.org/10.5588/ijtld.12.0573.
23. Okuonghae D. A mathematical model of tuberculosis transmission with het- erogeneity in disease susceptibility and progression under a treatment regime for infectious cases. Appl Math Model 2013;37(10–11):6786–808.
24. Houngbo PT, Coleman HLS, Zweekhorst M, De Cock Buning T, Medenou D, Bun- ders JFG. A model for good governance of healthcare technology management in the public sector: learning from evidence-informed policy development and implementation in Benin. PLoS One 2017;12(1):e0168842, http://dx.doi.org/ 10.1371/journal.pone.0168842.
25. Kern SE, Jaron D. Healthcare technology, economics, and policy: an evolving balance. IEEE Eng Med Biol Mag 2003;22(1):16–9, http://dx.doi.org/10.1109/ memb.2003.1191444.
26. Panovska-Griffiths J. Can mathematical modelling solve the current Covid-19 crisis? BMC Public Health 2020;20:551.
27. Ndaïrou Faïc¸ al, Area Iván, Nieto Juan J, Torres Delfim FM. Mathematical mod- eling of COVID-19 transmission dynamics with a case study of Wuhan. Chaos Solitons Fractals 2020;135(June):109846.
28. https://www.who.int/publications-detail-redirect/surveillance-strategies-for-covid-19-human-infection.
29. https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/about-epidemiology/monitoring-and-tracking.html.
30. Zhang RX, Li J, Zhang T, Amini MA, He C, Lu B, et al. Importance of integrating nanotechnology with pharmacology and physiology for innovative drug deliv- ery and therapy—an illustration with first hand examples. Acta Pharmacol Sin 2018;39:825–44, http://dx.doi.org/10.1038/aps.2018.33.
31. Paliwal Praveen, Sargolzaei Saman, Bhardwaj Sheetal K, Bhardwaj Vinay, Dixit Chandra, Kaushik Ajeet. Grand challenges in bio-nanotechnology to man- age COVID-19 pandemic. Front Nanotechnol 2020, http://dx.doi.org/10.3389/ fnano.2020.00003.
32. Kostarelos K. Nanoscale nights of COVID-19. Nat Nanotechnol 2020;15:343–4, http://dx.doi.org/10.1038/s41565-020-0687-4.
33. Pen˜a-Bahamonde J, Nguyen HN, Fanourakis SK, et al. Recent advances in graphene-based biosensor technology with applications in life sciences. J Nanobiotechnol 2018;16:75.
34. Qiu Guangyu, Gai Zhibo, Tao Yile, Schmitt Jean, Kullak-Ublick Gerd A, Wang Jing. Dual-functional plasmonic photothermal biosensors for highly accurate severe acute respiratory syndrome coronavirus 2 detection. ACS Nano 2020, http://dx.doi.org/10.1021/acsnano.0c02439.
35. Sui-Yuan Chang, Kuo-Yen Huang, Tai-Ling Chao, Han-Chieh Kao, Yu-Hao Pang, Lin Lu, et al. Nanoparticle composite TPNT1 is effective against SARS-CoV-2 and influenza viruses. Research Square (Preprint). https://doi.org/10.21203/rs.3.rs- 52066/v1.

36. Nanomaterials based company: http://www.tripod-nano.com/en.
37. Choi JR. Development of point-of-care biosensors for COVID-19. Front Chem 2020;8:517, http://dx.doi.org/10.3389/fchem.2020.00517. Published 2020 May 27.
38. Yingjie Y, Fanqiang B, Huiling Z, Yongheng W, Jianxun C, Xing W, et al. Biosafety materials: an emerging new research direction of materials science from the COVID-19 outbreak. Mater Chem Front 2020;4:1930–53, http://dx.doi.org/10. 1039/D0QM00255K.
39. https://www.who.int/news-room/detail/03-04-2020-digital-technology-for-covid-19-response.
40. Cohen AB, Dorsey ER, Mathews SC, Bates DW, Safavi K. A digital health industry cohort across the health continuum. Npj Digit Med 2020;3:68, http://dx.doi. org/10.1038/s41746-020-0276-9.
41. [Agrebia Said, Larbi Anis. Use of artificial intelligence in infectious diseases. Artif Intel Precis Health 2020:415–38.
42. Technology company on mass healthcare: https://www.mhospitals.com/.
43. Fitzpatrick MC, Bauch CT, Townsend JP, Galvani AP. Modelling microbial infec- tion to address global health challenges. Nat Microbiol 2019;4:1612–9.
44. https://www.cdc.gov/coronavirus/2019-ncov/php/contact-tracing/strategies- to-reduce-spread.html.
45. Delivering better insights for better health: https://www.ibm.com/industries/ healthcare/solutions/population-health-insights.
46. Public Health Management of Healthcare Workers: https://www.cdc.gov/coronavirus/2019-ncov/hcp/non-us-settings/public-health-management-hcw-exposed.html.
47. CDNA guidelines for the prevention, control and public health management: https://www.health.gov.au/resources/publications/cdna-guidelines-for-the-prevention-control-and-public-health-management-of-covid-19-outbreaks-in-correctional-and-detention-facilities-in-australia.
48. Barroa K, Malone A, Mokede A, Chevance C. Management of the COVID-19 epi- demic by public health establishments—analysis by the Fédération Hospitalière de France. J Visc Surg 2020;157(3):19–23.
49. Chen Y, Li Z, Zhang YY, Zhao WH, Yu ZY. Maternal health care management during the outbreak of coronavirus disease 2019. J Med Virol 2020;92(July (7)):731–9, http://dx.doi.org/10.1002/jmv.25787. Epub 2020 Apr 17. PMID: 32219871.
50. Garg M, Wray CM. Hospital medicine management in the time of COVID- 19: preparing for a sprint and a marathon. J Hosp Med 2020;15(May (5)):305–7, http://dx.doi.org/10.12788/jhm.3427. Epub 2020 Apr 8. PMID: 32379037.
51. Velic A, Jaggessar A, Senevirathne SWMAI, Mathew A, Paritala PK, Islam M, et al. Adaptations and lessons from COVID-19: a perspective on how some industries will be impacted. Adv Mater Lett 2020;11(7):20071533, http://dx.doi.org/10. 5185/amlett.2020.071533.
52. Whole-person health management solutions for any value-based care initiative: https://www.zeomega.com/.
53. A well-functioning healthcare system is the need of the hour: https://www.downtoearth.org.in/blog/health/covid-19-a-well-functioning-healthcare-system-is-the-need-of-the-hour-72504.

54. Pathophysiology, Epidemiology, Clinical Management and Public Health Response: https://www.frontiersin.org/research-topics/13377/coronavirus- disease-covid-19-pathophysiology-epidemiology-clinical-management-and- public-health-resp.
55. Personalize patient care on one unified platform: https://www.salesforce.com/ solutions/industries/healthcare/health-cloud/.
56. WHO technical guidance: Patient management: https://www.who.int/ emergencies/diseases/novel-coronavirus-2019/technical-guidance/patient- management.
57. Overview of Testing for COVID-19: https://www.cdc.gov/coronavirus/2019-ncov/hcp/testing-overview.html?CDC AA refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fhcp%2Fclinical-criteria.html.
58. Management of persons, including healthcare workers, who had contact with COVID-19 cases, including tracing, identification, listing and follow-up: https://www.ecdc.europa.eu/en/covid-19-contact-tracing-public-health-management.
59. Bose S, Adapa S, Aeddula NR, Roy S, Nandikanti D, Vupadhyayula PM, et al. Medical management of COVID-19: evidence and experience. J Clin Med Res 2020;12(6):329–43, http://dx.doi.org/10.14740/jocmr4201.
60. Phua J, Weng L, Ling L, Egi M, Lim CM, Divatia JV, et al. Intensive care management of coronavirus disease 2019 (COVID-19): challenges and recommendations. Lancet Respir Med 2020;8(5):506–17, http://dx.doi.org/10.1016/ S2213-2600(20)30161-2.
61. Population health: https://www.wipro.com/en-IN/healthcare/population- health-management-bending-the-curve-with-collaboration-access-and- interoperability/.
62. Healthcare data and software company: https://www.arcadia.io/.
63. Gai R, Tobe M. Managing healthcare delivery system to fight the COVID-19 epidemic: experience in Japan. Glob Health Res Policy 2020;5:23, http://dx.doi.org/10.1186/s41256-020-00149-064.
64. The doctor-recommended way to manage asthma or COPD: https://www.propellerhealth.com/.
65. Bielicki JA, Duval X, Gobat N, Goossens H, Koopmans M, Tacconelli E, et al. Mon- itoring approaches for health-care workers during the COVID-19 pandemic. Lancet Infect Dis 2020;20:e261–67.
66. Keesara Sirina, Jonas Andrea, Schulman Kevin. Covid-19 and health care's digital revolution. N Engl J Med 2020;382:e82, http://dx.doi.org/10.1056/NEJMp2005835.
67. Tian S, Yang W, Grange JML, Wang P, Huang W, Ye Z. Smart healthcare: making medical care more intelligent. Glob Health J 2019;3(3):62–5.
68. A collection of articles and other resources on the Coronavirus (Covid-19): https://www.nejm.org/coronavirus.
69. COVID-19 Resource Centre: https://www.thelancet.com/coronavirus.
70. Papers on Management Science in the Fight Against COVID-19: https://www. springer.com/journal/10729/updates/18040716.
71. Sengupta Mayuree, Purushotham H. Severe acute respiratory syndrome-related coronavirus: a patent based view. Adv Mater Lett 2020;11(5):20051503, http://dx.doi.org/10.5185/amlett.2020.051503.

72. Jo Wonkwang, Chang Dukjin. Political consequences of COVID-19 and media framing in South Korea. Front Public Health 2020;8(425), http://dx.doi.org/10. 3389/fpubh.2020.00425.
73. Anton Pak, Adegboye Oyelola A, Adekunle Adeshina I, Rahman Kazi M, McBryde Emma S, Eisen Damon P. Economic consequences of the COVID-19 outbreak: the need for epidemic preparedness. Front Public Health 2020;8(241), http:// dx.doi.org/10.3389/fpubh.2020.00241. ISSN=2296-2565.
74. Nicola M, Alsafi Z, Sohrabi C, Kerwan A, Al-Jabir A, Iosifidis C, et al. The socio- economic implications of the coronavirus pandemic (COVID-19): a review. Int J Surg 2020;78:185–93, http://dx.doi.org/10.1016/j.ijsu.2020.04.018.
75. Fancourt Daisy, Steptoe Andrew, Wright Liam. The Cummings effect: politics, trust, and behaviours during the COVID-19 pandemic. Lancet 2020;396(10249):464–5, http://dx.doi.org/10.1016/S0140-6736(20)31690-1.
76. Tisdell CA. Economic, social and political issues raised by the COVID-19 pandemic. Econ Anal Policy 2020;68:17–28, http://dx.doi.org/10.1016/j.eap.2020. 08.002.
77. Weible CM, Nohrstedt D, Cairney P, Carter DP, Crow DA, Durnová AP, et al. COVID-19 and the policy sciences: initial reactions and perspectives [published online ahead of print, 2020 Apr 18]. Policy Sci 2020:1–17, http://dx.doi.org/10. 1007/s11077-020-09381-4.
78. Institute of Medicine (US) Committee on Technological Innovation in Medicine, Gelijns AC, Halm EA, editors. The changing economics of medical technology. Washington (DC): National Academies Press (US); 1991 (Medical Innovation at the Crossroads, No. 2.) 9, Medical Device Innovation and Public Policy in the European Economic Community. Available from: https://www.ncbi.nlm. nih.gov/books/NBK234302/.