Review Article

Covid-19: Learning Updates

ABM Moniruddin[1], MST Nazmun Nahar[2], Tanvirul Hasan[3], Salma Chowdhury[4], Baikaly Ferdous[5], Md Rashed Khan[6], MA Rouf[7]

Abstract

Covid-19 had been identified as an acute respiratory disease and many other systemic illnesses, causing unusual morbidity and death, particularly in older people and other people with co-morbidities. The disease is caused by an extremely infectious, super-rapidly spreading and super-promptly mutating novel coronavirus, now known as the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2 virus). Covid-19 became a pandemic in 2020 and 2021. Though its pandemic nature is now declining, it is still in existence in many parts of the world, causing substantial mortality and morbidity. The Wuhan Municipal Health Commission of Hubei province, officially notified it first on December 31, 2019, though the first date of symptom onset of a cavid-19 case was first recorded on December 8, 2019 on basis of the patient's recall during the investigation in the Wuhan city of central China. China publicly had circulated the genetic make-up of the causative virus on January 12, 2020. From the 1st January, 2020 onwards, the WHO (World Health Organization) had worked on it several times at several levels till March 11, 2020, When WHO deeply notified its alarming spread and severity, characterizing it as a pandemic. It had created a severe panic all over the world, interfering with life, health, economy, trade, commerce, livelihood and living standard of people. This Covid-19 had taught us a myriad of lessons how to tackle and handle catastrophic massive disasters in emergent situations, probing into our limitations and requirements and emphasizing on local, regional. national and international awareness, cooperation and coordination.

Key words: *ARDS (Acute Respiratory Distress Syndrome), Novel Coronavirus, Pandemic, Pneumonia.*

Date received: *16.06.2022*

Date accepted: *03.09.2022*

DOI: https://doi.org/10.3329/kyamcj.v13i3.63272

KYAMC Journal. 2022; 13(03): 170-176.

Introduction

During November and December of 2019, an atypical pneumonia of unknown etiology (PUE) was notified from the Huanan Seafood Market in the Wuhan city of China. These PUE cases were later confirmed to be caused by the novel coronavirus named the SARS-CoV 2 (Severe Acute Respiratory Syndrome Coronavirus 2 as named on the 11th February, 2020 by the ICTV (International Committee on Taxonomy of Viruses) & the disease complex caused by this novel coronavirus is now known as COVID-19 or simply Covid-19. Its symptom was first recorded on December 8, 2019 in the Wuhan city. It was notified by China to the WHO on Dec 31, 2019. China published its genetic make-up on January 12, 2020. Both China and the WHO responded immediately to this super-infectious super-spreading COVID-19 with the lessons learned from the previous epidemics of the SARS-CoV in 2002-2003.[1-3] The WHO promptly and formally cautioned the rest of the world of this Public Health Emergency of International Concern (PHEIC) by the end of January, 2020, well ahead before the pandemic spread had started. When this emergency was declared, only 25 regions and countries outside the mainland of China had reported any cases of this disease, and out of these, only 6 (namely Hong Kong, Singapore, Japan, Thailand, Taiwan, South Korea) had reported only over 10 cases. As ill luck would have it, the rest parts of the world had not paid immediate necessary attention to the cautions of WHO and China. It was not until mid-March—when the DG (Director General) of WHO announced COVID-19 as a global pandemic, the rest world seriously became cautious and started accepting that super-spreading extremely alarming pandemic to protect their people.[4-6]

Prevalence

In accordance to Worldometer report on October 25, 2022 since January 2020, globally total 633,350,526 cases were identified of which 6,584,414 patients died.7 On October 25, 2022 since

1. Professor & HOD of Surgery, KhwajaYunus Ali Medical College & Hospital, Enayepur, Sirajgonj, Bangladesh
2. Assistant Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical College (BSMMC), Faridpur, Dhaka, Bangladesh
3. Medical Officer, Institute of Nuclear Medicine & Allied Sciences, Bangladesh Atomic Energy Commission, Dinajpur, Bangladesh
4. Ex-Professor (C.C.), Dhaka Medical College, Dhaka, Bangladesh
5. Registrar, Department of Surgery, Khwaja Yunus Ali Medical College & Hospital, Enayepur, Sirajgonj, Bangladesh
6. Senior registrar, Department of Surgery, KhwajaYunusAli Medical College & Hospital, Enayepur, Sirajgonj, Bangladesh
7. Associate Professor of Surgery, Khwaja Yunus Ali Medical College, Enayetpur, Sirajganj, Bangladesh

Corresponding author: ABM Moniruddin, Professor & HOD of Surgery, Khwaja Yunus Ali Medical College & Hospital, Enayepur, Sirajgonj, Bangladesh. **Cell Phone:** 01795078217, **E-mail:** abmmu@yahoo.com

January 2020, in accordance to the COVID-19 Dynamic Dashboard for Bangladesh, 2,034,348 were confirmed in Bangladesh by laboratory tests, of which 29,415 died. In Bangladesh, on October 25, 2022 only one patient died of Covid-19; 3246 persons were tested for Covid-19 and 185 reported positive, the detection rate being 5.70% on that day.8 Certainly the detection rate and morbidity are now declining.[7,8]

Pathology

The identification of the COVID-19 origin is essential to prevent the next global pandemic. But the actual origin of SARS-CoV-2 is yet unknown. Phylogenetically, this incriminated novel coronavirus (of SARS-CoV-2) appears to link to have links to many wild coronaviruses found in several wild animals like horseshoe bats, pangolins. But none of these wildlife species has yet been tested positive for SARS-CoV-2 in China. It is currently hypothesized that the virus entry into the humans could have been possible by some form of cross-species transmission through one or more intermediate host species. However, this assumption is primarily based on our discovery of SARS, MERS, and avian flu, and this assumption needs to be revisited and re-assessed. It is thought that the live animal Huanan Seafood Market of China might have served as an amplifier region due to large number of humans in close proximity to one other in that cold weather.[9-11] Now, the COVID-19 patients are the principal sources of infection of this prevailing global pandemic. Asymptomatic carriers have also been incriminated to spread the virus. Respiratory droplets from coughing, sneezing, laughing and close contacts are considered as the main transmission routes. The SARS-CoV-2 has also been isolated from blood, feces and urine. Thence, aerosol or contact transmission as a result of contamination by blood, feces and urine of infected individuals are to be borne in mind.[12-14] As almost all people irrespective of age, sex, caste, color, religion, social and economic status are universally susceptible to SARS-CoV-2, Covid-19 had spread rapidly & exponentially in a geometric fashion across the world. Tobacco abuse as it causes immunosuppression and respiratory illnesses is at high-risk for infection.[1,15,16] Covid-19 patients mainly presents with weakness, tiredness, pyrexia, dry cough. Few patients may have the symptomatic running or stuffy nose, headaches, muscle-aches, and diarrhea, dizziness, impaired consciousness, ataxia, epilepsy, hyposmia, hypogeusia, hypoxia, and neuralgia. More critically ill patients develop overt hypoxia and dyspnea, one week after the onset of symptoms.[5,17,18] On rapid progression, ARDS (Acute Respiratory Distress Syndrome), complicated shock and metabolic acidosis develop. Other than the respiratory tract, SARS-CoV-2 can attack many other human tissues and organs like the spleen, the liver, the heart, the kidneys, the brain, the neurospheres, the cerebralorganoids, the pluripotent stem cell–derived human neural progenitor cells. The lungs are the organs most commonly affected by COVID-19. The principal complications of COVID-19 include pneumonia, ARDS (Acute Respiratory Distress Syndrome), MODS (Multi-Organ Dysfunction Syndrome), MSOF (Multi-System Organ Failure), septic shock, cardiac failure, renal failure, DIC (Disseminated Intravascular Coagulation), Stroke (CVAs: Cerebro-Vascular Accidents), other thrombo-embolic complications and death etc. Sepsis and Cytokine storms cause hemolysis, DIC (Disseminated intravascular Coagulation) etc. along with or without their complications.[19]

That is no human organ or tissue is immune to its attack directly or indirectly. From the original Wuhan variant of coronavirus COVID-19, several other more infective and more spreading mutant variants have been isolated so far (from such different regions and territories of the world as Italy, New York, Brazil, India, UK, South Africa, till the 30th Nov, 2021 that include the alpha variants, the beta variants, the gamma variants, the delta variants, the delta plus variants and the omicron variants etc. Several other more variants with variable pathologies may emerge in the days to come.[20,21]

Significance of learning lessons

It has been pathetically costing the lives of a huge number of people worldwide while in addition causing severe tolls on societies, economies, education, trade, commerce and recreation. To have protection from future pandemics or similar disaster and health emergencies is the central theme of getting lessons. Thence we are to adopt all possible measures to get rid of its detrimental effects worldwide. We are to accumulate and share our knowledge and lessons to prevent its further spread and its detrimental effects as a whole globally considering the globe as a single home for all people of the world. The COVID-19 pandemic has taught us myriad of lessons. These lessons have utmost potentials to improve patient care and health care delivery systems in coming days. The tele-health, tele-medicine, e-mail teaching and learning, online meeting have opened an expanding vista of innovative coverage.

Lessons that we have learned from the COVID-19 pandemic is principally remaining well prepared for the next pandemic or any other similar disaster for the best way of successfully tackling all ensuing emergencies. It is quite impossible to predict definitely which pandemic-like disaster will attack next and what implications and impacts the human will face. If we sum up our accumulated knowledge from COVID-19 in a sentence, it should encompass our universal health strategies and preparedness.[16,22,23] The lessons we have learned are not exhaustive, but provide a glimpse what need for the benefit of all people all over the world. The following are the lessons we must realize in our post-Covid-19 world. It is a challenge for the global heads to control and stop the COVID-19 pandemic.[9]

Lessons we have learned regarding Control Strategies

Different countries have attempted different strategies to contain and combat the pandemic. Some countries like Sweden initially attempted to depend on herd immunity by natural infections. Some other countries attempted mitigation or suppression. But largely these attempts had almost nil effects on stopping its spread. In general, many countries attempted to contain the spread through various NPIs (Non-Pharmaceutical Interventions), like enforcement of lockdowns of variable intensity etc. But all these were found inadequate as in the United States and India, or delayed as in Russia, the UK and France.[23] Enforcement of lockdowns could have reduced rapid spread of infections in many regions, but failed to limit its massive spread as a whole. The most effective success of NPIs was confirmed only in China.[3,10] The WHO-China Joint Mission on COVID-19 had confirmed that the urgent and prompt prevention and control strategies that China followed to contain the pandemic were there asserting on three main stages. The first stage focused primarily on preventing measures from

being spread from Wuhan in association with closing wet markets and accelerated surveillance to try to detect the zoonotic origin. The second stage targeted on controlling the effects of the pandemic through medical service, entrusting avant-garde diagnostic aids for rapid detection, and isolation of infected humans, and critically reducing the speed of outbreak by restricting the movement of people, forbidding from mass gatherings, detecting and quarantining contacts, and enforced border non-movement. Lastly, in the third stage the target shifted to containing isolated plus sporadic cases. In this last stage there was an essential attempt to entrust a reasonable and acceptable equilibrium between successful disease containment and expected social and financial growth. The successful realization of these approaches made China the first most successful nation in terms of COVID-19 control.[24,25]

China as a single nation topped in cumulative infection rates. Subsequently, China had many small waves of outbreak because of imported cases. For both control and suppression targets, lock-down of the regions and cities, household lockdown and isolation plus quarantine policies were the three most significant factors for achievement of the success. Even thereafter, China had experienced no significant recurrent outbreaks despite the cold climate. Such mitigation strategies led to achieve public health goals, simultaneously keeping the society vigilant, alert, functioning and active and financially-sound and strong. That is to say that the best global integration had confirmed for curtailing transmission by prohibiting from social gatherings, universal mask use, prompt detection of new cases and contact tracing along with enforced restriction on international tours and travels.[26.27]

Recommended lessons for any unpredictable future pandemic-like disasters

We had learnt multiple crucial lessons from the COVID-19 pandemic as regards to the necessities for early response and extensive surveillance, plus the requirements for coordinated and effective formulations to control this infectious agent. We are not sure and we don't know many crucial aspects how to contain and prevent any future pandemic. On basis of what we have learnt from SARS-CoV-2, we can deduce the following recommendations.[12,26]

1. Adequate future preparation and planning can tackle unpredictable future pandemics and disasters better. Rapid detection of the causative new pathogen, genome sequencing and formulation of the principal epidemiological variables related to outbreak, spread and transmission are very much needed for the global management of the future pandemic. Scientists, participating people and policy makers are to act in an integrated linked chain to achieve the goal through rapid implementation of objectives.
2. Medical equipment for oxygenation support like oxygen masks, respirators, and ECMO (Extra-Corporeal Membrane Oxygenation) and even PPE (Personal Protection Equipment)-like disposable water-proof gowns face-masks, gloves etc. are to be immediately and adequately available. Creative solutions are to be addressed in advance in accordance to the varied other clinical syndromes of the unpredictable next pandemic that may include hemorrhage etc. other than those of COVID-19.
3. Rapid implementation of mitigating and control strategies at all levels (including personal, familial, official, social, local, regional, national and international) are to be considered to prevent transformation of local epidemic into global pandemic.
4. Scientific activities are to be kept updated and dynamic to identify the probable reservoirs, intermediate hosts, the live-animal markets that import and maintain the culprit pathogens.
5. Internationalization of genome and genome sequencing are very much needed for developing vaccines within the best possible earliest time.
6. Enforcement of NPIs (Non-Pharmaceutical Interventions) like social awareness, lock-downs, staying at home, sealing of borders, suspension of tours and travels etc. are to be implemented soon if urgently indicated.
7. Global scientific conferences are to be arranged, as soon as possible, to discuss the biomedical issues related to the pandemic, the pandemic control, the effectiveness of the various measures adopted in different countries and the need for adoption of improved strategies.
8. During any pandemic, values like equity, solidarity and collaboration have been centralized to resilience and are essential to achieve an effective outcome. It is as if none is secured unless everyone is secured.
9. Active support and enforcing regional preparedness and building capacity to respond to emergencies should be the priorities. These are to be strengthened by visionary, science-driven, large-scale flagship research initiatives.

Lessons learned directly attributable to the COVID-19 itself

1. We shall have to remain always prepared in hospitals for unwanted unpredictable rise in service demands in natural disaster like a large casualty (accident). We may have to go with doubling or tripling intensive care unit (ICU) beds, arranging adequate space for the incoming all patients, more recovery-rooms, building. full-fledged field hospitals with all equipment, staffing and other facilities like pharmacies, blood banks, imaging, sufficient ICU nurses, respiratory therapists, ICU physicians, and dialysis nurses etc. We may have to cancel all elective surgeries and to discharge stable patients without delay. We shall have to arrange ―just in time‖ training for clinicians-nursing and other auxiliary staff. The regional health and hospital authorities should have clean-cut plans and policies to handle emergency situations. In may need to recruit and train physicians, nurses and other health care staff.[5,27]
2. The hospitals should have a clear Line of Sight using call bells, windows, glass doors communication and video devices, minimizing health staff entries into patients' rooms etc., still entrusting concrete and complete care of the patients.
3. Entrusting clean Air by minimizing air changes in patient rooms, with more frequent air changes in isolation rooms, lowering transmission of COVID-19 by installing high-efficiency particulate air filters and UV lights, lowering aerosolized transmission by electronic (bipolar ionization) filtration and high fresh air exchange, enforcing the best possible quality air in hospitals, waiting rooms and other common areas.

4. Assuring emotionally support to health workers like frontline superhuman heroes for their extra-ordinary courage, energy, despite the probability of transmitting the disease to their family members. The health authorities shall have to entrust stress management and resilience training especially in permanent easy-to-access mental and spiritual health centers established in close vicinity.

5. Continuation of wearing masks in the hospitals even if COVID-19 disappears apparently. Wearing masks along with and social distancing and hand washing dramatically lower air-borne & particle-borne COVID-19, as it spreads through respiratory droplets (like influenza) or aerosolized spread (like measles).
6. Using Hi-Tech communication technology like electronic tablets to communicate with friends, families, dear, near and far ones to restrict physical visits.
7. Allowing only minimal caches of excess supplies and minimum consolidated supply chains to curtail and cut expenses in accordance to the national, regional and local plans and policies.
8. Lowering the loads of unusual physical documentation (hard copies), using multiple electronic medical records that should be continued even after the pandemic to allow health workers to have more time with patients and to get protected from exhaustion.
9. Irrespective of racial, ethnic, cultural and literal identity, universal primary health care is to be provided to all concerned along with dissemination of antiracism and equity, plus involvement of all persons in regular patient care and recruitment practices and policies and organized partnership with community-based agencies and other ways to address all parameters of health.
10. During the COVID-19 pandemic, social and familial bereavement, isolation, loss of job, financial insecurity, fear, anxiety, insomnia all are triggering mental health processes aggravating existing ones. Many people are getting addicted to drug abuse. Moreover, complicated COVID-19 itself may lead to neurological and mental illnesses like delirium, agitation, and stroke. People with pre-existing mental, neurological or drug abuse disorders are more vulnerable to COVID-19 infection with higher potential to greater risk of severe outcomes and even death. Counseling and psychosocial support are here much worthwhile.
11. Proper nutrition and hydration are vital to combat COVID-19. Well-balanced diet makes one healthier with stronger immune systems and reduced risks of illnesses and infections. Fresh and unprocessed foods every day give one the vitamins, minerals, dietary fiber, protein and antioxidants that one needs. Drinking enough water, avoid carbohydrates, lipids, oils and salt significantly reduce the risk of getting overweight (BMI 25 or more), obesity (BMI 30 or more), heart diseases, strokes, diabetes and certain types of cancer.
12. Documented side effects to COVID-19 vaccines include mostly mild to moderate transient fever, fatigue, headache, muscle pain, chills, diarrhea, and the injection site pain etc. variably differing on the specific type COVID-19 vaccine.
13. ―Pandemic fatigue crisis‖ evolves gradually over time and is affected by the cultural, social, structural and legislative factors.
14. Physical activities and relaxation techniques are valuable tools to keep one calm and to protect one's health. The World Health Organization recommended 75 minutes of vigorous-intensity or 150 minutes of moderate-intensity physical activity (exercise) per week, or a combination of both of these two.
15. Healthy diet is of utmost importance for the immune system during the COVID-19 pandemic. Healthy and balanced nutrition can prevent the development other health related illnesses like obesity, heart diseases, diabetes and many types of cancers. The WHO recommended that less than 5% of total energy for adult persons should come from free sugars (about 6 teaspoons) ideally during the quarantine period. Fresh fruits are the best sources of sugar here. Frozen fruits, canned juicy fruits, dried fruits with no added sugar ad no syrup prepared from fruits are acceptable alternatives. Though fresh or frozen vegetables are usually the preferred, canned vegetables like mushrooms, spinach, peas, tomatoes, green beans etc. are good alternatives with a longer shelf life, ensuring a sufficient intake of vegetables during COVID-19 quarantine. Salt additives are discour- aged. Tuberous and root vegetables such as carrots, turnips and beets, as well as vegetables like cabbage, broccoli and cauliflower are relatively nonperishable. Garlic, ginger and onions are also of great options to be preserved at home, as they can be used as flavoring agents to a variety of food items.
16. A corticosteroid (like synthetic dexamethasone or betamethasone) is one of the most commonly therapeutically used drug for complicated COVID-19. It is generally safe. It presents a favorable benefit-risk profile, especially in patients with severe pneumonia, but the benefit is less significant in patients with non-severe pneumonia. As it is being prescribed for a short-term treatment protocol, even at high doses, steroids are not associated with serious side effects. Steroid induced hyperglycemia is usually temporary.[1,2]
17. Standard recommendations to prevent its spread include frequent hand washing and cleaning with alcohol-based sanitizers or soap and water; use of ideal masks covering the nose and mouth, using a flexed elbow or disposable tissue while coughing or sneezing; and avoiding close contact with COVID-19 and suspected COVID-19 patients who have fever and cough.
18. Smoking substantially increases the risks of adverse health outcomes for COVID-19 patients, including being admitted to ICU, requiring mechanical ventilation and suffering other severe complications. E-cigarettes like ENDS (Electronic Nicotine Delivery Systems) and ENNDS (Electronic Non-Nicotine Delivery Systems) are detrimental to health and augment the risk of heart and lung diseases. Thus e-cigarette use may the risk of infection.
19. Coronaviruses die very quickly when exposed to the UV light or sunlight. Like all other enveloped viruses, COVID-19 virus survives longest when the temperature is at room temperature or lower, and when the relative humidity is low (<50%). COVID-19 virus is killed at temperatures similar to that of other known viruses and bacteria found in food. People are not known to get infected with COVID-19 virus from food.
20. Exercising physically 10–15 times or more, rest for 30–60 seconds, and repeating it up to 5 times. This exercise strengthens muscles. Not to exercise heavily if one has a fever, cough and dyspnea. Staying home to have optimum rest, seeking medical attention are of paramount importance, following the instructions of local and regional health authorities.
21. Walking or cycling along with physical distancing and washing and cleaning hands with water and soap or alcohol-based sanitizers are advised by health experts to keep oneself physically and mentally strong against COVID-19.
22. Asymptomatic people like infected ones can transmit COVID-19. That is why it is essential that all infected persons are to be identified by testing and then isolated.
23. To prevent infection, one is to avoid touching surfaces, especially in public settings or health institutes/hospitals/clinics or other facilities, in case COVID-19 patients have touched them. These potentially infected surfaces are to be cleaned regularly with ideal disinfectants.[3,9,27]

Additional lessons specific for underdeveloped, developing and least developed countries

In underdeveloped, developing and least developed countries, like Bangladesh, since the inception of the pandemic, the respective governments along with the local and regional authorities like city corporations/municipalities, local authorities in rural areas, and Health Care Facilities (HCFs), the DPHE (Department of Public Health Engineering), the UNICEF and other NGOs have been working in coordination with the political and the religious leaders like those of Islamic Relief Bangladesh. They ensured the continuity of uninterrupted disinfected safe water supply, plus implementation of sustaining behavioral change programs to entrust good hand-washing practices, scaling up innovativeness in hand-washing spots, distribution of Information Education and Communication (IEC) materials on hand hygiene, organized monitoring, follow-up and reporting on water quality and hand-washing practices in all rural and urban areas. These all attempts are for uninterrupted safe water supply across all areas of the country to ensure safe water for hand-washing, as well as to have protection against other water-borne illnesses, to provide supports for repairing of hand-pumps, chlorination of piped water supplies, disinfection of water centered surroundings, distribution of soaps and detergents, plus establishment of hand-washing devices in common places, provision of bleaching powder, tools and spare parts for operation and maintenance of tube wells.[17,22] Bangladesh has also enforced all early detection, adequate treatment, all preventive measures including nationwide mass vaccination as far as practicable and possible.[1,2]

Lessons learnt from changed education system

The COVID-19 pandemic had caused all schools shut globally over 1.2 billion children were not attending classes physically. This distinctly had caused dramatic rise of e-learning remotely on digital platforms. Online teaching and learning showed increased retention of information, and it needs less time giving us a new platform of education to consider. Online e-learning may be more effective in a number of ways, students being able to learn faster (as high as 40-60% less time to learn than in a classical classroom teaching system as the students can learn on their own rhythm, returning back and re-reading, skipping, or enhancing through ideas as they deem suitable). But some students were/are there without uninterrupted internet access and technology are deprived of digital e-learning; this gap was found across the countries and between income brackets within the same country.[2,15] Notwithstanding, the effective e- learning is variable amongst different age groups Kids like children, and other younger students are more easily distracted in absence of rigid structured classes. Through proper use video capabilities, this problem can be solved. Online teaching and learning may be the impetus to establish a new, more effective way of educating students in the days to come. At least, e-learning may be a part of new normal experienced benefit at the first-hand. The pandemic has taught us that e-learning technology can play a role in critical situations. It has opened a new horizon to all of us to utilize its full strength to disseminate knowledge across borders, companies, and all parts of society.

Lessons learnt from the COVID-19 pandemic for financial stability

Key lessons and actions invariably should involve all the Financial Stability Boards of the world amidst the market turmoil that underscored the need to strengthen the resilience in the non-bank financial intermediation sectors for market and institutional resilience, the importance of effective operational resilience and the crisis preparedness along with monitoring the COVID-19 policy responses as they are wound down, to detect the systemic vulnerabilities early on; addressing the debts overhanging in the non-financial corporate sectors; promoting resilience amidst rapid technological changes, evaluating in due course how macro-prudential policy has functioned during the pandemic and its aftermath. Billions of people had been in lockdown, unable to visit, had lost job, had deprived of education, desperately struggling at home, in care homes and ICUs. Many were dying, isolated from their beloved ones causing massive physical and psychological upset all over the world. Accordingly, we should have:[1,2,19,26]

1. The fastest detection and the best responses that need a massive integrated global health program.
2. The clearest and the most integrated scientific approach to formulate policies for all people in the globe.
3. Adequate preparedness needs dynamic and continued efforts, scrutiny and reviews. Emergency tools are to be the fastest and the easiest to launch.
4. The integrated endeavors need to be an automatic sharp reflex. PPPs (Public-private partnerships) and strong supply chains are essential to ensure the supply of critical equipment and medicines.
5. An all-global integration is essential to have clinical research the fastest, the broadest and the most effective.
6. The capability to cope with a pandemic crisis relies on increased and sustained investment in health management processes.
7. The pandemic prevention, preparedness and responses are to be global priorities.
8. The most integrated sophisticated approach to handle misinformation and disinformation should be established.
9. These early lessons from the COVID-19 pandemic should keep the world leaders always unified for successful handling current and future calamities.

Summarized global fundamental lessons from the COVID-19 pandemic

This COVID-19 pandemic has essentially has changed the world for good and has changed our life as a whole from our morning routines to our goals and priorities. The vaccines are successfully lowering down infections, but the variants are still knocking awkward from its primary one to the current omicron one through the alpha, the beta, the gamma, the delta, the delta plus variants. Thence, we are to remain always vigilant to remove its persistent threat. It is of utmost importance to remember and recognize our history and lessons.[13,19] The lessons from covid-19 and similar air-borne and particle-borne respiratory pathogens include:

1. The definite tool of using masks despite vaccination;
2. Tele-medicine and tele-health have got a new normal place;
3. Universal vaccination as an essential tool;
4. All people are to be treated equally irrespective of caste; color, religion, social and economic status;
5. Mental health has to be considered equally;
6. We are to entrust resilience;

7. Essential awareness and proper management of the community and the technological advancement;
8. Always highlighting the politeness and humanity.

Conclusion

We are to honor the people we lost to COVID-19 by learning from the experience in ways that could benefit all patients. We believe that the lessons we are learning from the pandemic would improve health care and hospital care delivery systems in day-to-day circumstances and future urgencies and needs. The existing COVID-19 pandemic has shown its devastating social, financial, educational outcomes. Known human civilization had experienced multiple similar global pandemics including the bubonic plague of the 14th century, the flu of the 20th century, the HIV/AIDS of the 20th and the 21st century. The risks of new pandemics in human populations are inevitable because of multiple determinants like the rapid dissemination of vectors, destruction of ecosystems and rapid increase in food production utilizing detrimental fertilizers and pesticides, rapid urbanization etc. Delayed international response to the PHEIC declared by the WHO caused the geometric and exponential spread of the COVID-19 pandemic. These are the vital areas that the international public health community for addressing to & emphasizing on the best future pandemic containment in an integrated global village. The most essential lesson we are to learn from COVID-19 is that the pandemic containment addresses to swift, efficient, integrated and continued response and vigilance at all local, regional, national and international levels. For the time being, humans had lost their supremacy over the nature. The Covid-19 pandemic had uncovered the mistakes and terrible realities amongst the global heads, paralyzing the trade, commerce, communication, business, economics, education systems, social and political life. At this time of global COVID-19 threat, we are to have responsible politicians around the world for multilateral cooperation to entrust and achieve national and multinational goals complimenting and complementing one another. The COVID-19 pandemic had revealed a vast ocean of kindness and benevolence in our communities around the globe irrespective of caste, color and religion, social and economic status.

References

1. Eric K. Wei, MD, MBA, Theodore Long, MD, MHS, Mitchell H. Katz, MD., JAMA Intern Med. 2021;181(9):1161-1163.

2. Tan W, Zhao X, Ma X, Wang W, Niu P, Xu W, et al. A novel coronavirus genome identified in a cluster of pneumonia cases - Wuhan, China 2019–2020. China CDC Weekly.(2020) 2:61–62.

3. Patel SY, Mehrotra A, Huskamp HA, Uscher-Pines L, Ganguli I, Barnett ML. Trends in outpatient care delivery and telemedicine during the COVID-19 pandemic in the US. JAMA Intern Med. 2021;181(3):388-391.

4. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet (2020) 395:470–473.

5. Shachar C, Engel J, Elwyn G. Implications for telehealth in a postpandemic future: regulatory and privacy issues. JAMA. 2020;323(23):2375-2376.

6. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019.N Engl J Med. (2020) 382:727–733.

7. Worldometer; COVID-19 Coronavirus Pandemic, Last updated: October 25, 2022, 08:42 GMT.

8. COVID-19 Dynamic Dashboard for Bangladesh, Last updated: October 25, 2022, 14:42 BST.

9. Andersen KG, Rambaut A, Lipkin WI, Holmes EC, Garry RF. The proximal origin of SARS-CoV-2 Nat Med. (2020) 26:450–452.

10. Uppal A, Silvestri DM, Siegler M, et al. Critical care and emergency department response at the epicenter of the COVID-19 pandemic. Health Aff (Millwood). 2020;39(8):1443-1449.

11. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature.(2020) 579:270–273.

12. Shang J, Ye G, Shi K, Wan Y, Luo C, Aihara H, et al. Structural basis of receptor recognition by SARS-CoV-2. Nature.(2020) 581:221–224.

13. Bell DL, Katz MH. Modernize medical licensing, and credentialing, too—lessons from the COVID-19 pandemic. JAMA Intern Med. 2021;181(3):312-315.

14. Liu K, Pan X, Li L, Yu F, Zheng A, Du P, et al. Binding and molecular basis of the bat coronavirus RaTG13 virus to ACE-2 in humans and other species. Cell.(2021) 184:3438-3451.

15. Nardell EA, Nathavitharana RR. Airborne spread of SARS-CoV-2 and a potential role for air disinfection. JAMA. 2020;324(2):141-142

16. Allen JG, Ibrahim AM. Indoor air changes and potential implications for SARS-CoV-2 transmission. JAMA. 2021;325(20):2112-2113

17. Uyeki TM, Wentworth DE, Jernigan DB. Influenza activity in the US during the 2020-2021 season. JAMA. 2021;325(22):2247-2248.

18. Wu F, Zhao S, Yu B, Chen YM, Wang W, Song ZG, et al. A new coronavirus associated with human respiratory disease in China. Nature.(2020) 579:265–269.

19. Salway RJ, Silvestri D, Wei EK, Bouton M. Using information technology to improve COVID-19 care at New York City Health + Hospitals. Health Aff (Millwood). 2020;39(9):1601-1604

20. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. Lancet Infect Dis. (2020) 20:533–534.

21. Wadhera RK, Wadhera P, Gaba P, et al. Variation in COVID-19 hospitalizations and deaths across New York City boroughs. JAMA. 2020;323(21):2192-2195.

22. Relman DA. Opinion: to stop the next pandemic, we need to unravel the origins of COVID-19. ProcNatlAcadSci USA.(2020) 117:29246–29248.

23. Li X, Giorgi EE, Marichannegowda MH, Foley B, Xiao C, Kong P, et al. Emergence of SARS-CoV-2 through recombination and strong purifying selection. Sci Adv. (2020) 6:eabb9153.

24. Maani N, Galea S. The role of physicians in addressing social determinants of health. JAMA. 2020;323(16):1551-1552.

25. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet.(2020) 395:497–506.

26. Bhuyan A. Experts criticise India's complacency over COVID-19. Lancet.(2021) 397:1611–1612.

27. Li Y, Campbell H, Kulkarni D, Harpur A, Nundy M, Wang X, et al. The temporal association of introducing and lifting non-pharmaceutical interventions with the time-varying reproduction number (R) of SARS-CoV-2: a modelling study across 131 countries. Lancet Infect Dis. (2021) 21:193–202.