



COVID-19 Pandemic: Scoping Review through the Lens of 9-Month-based Knowledge and Brief Snapshots of 10 Cases and Five Family Units, Riyadh, Saudi Arabia

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Authors' contributions

This work was carried out in collaboration between both authors. Author NAQ designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NAQ and AAAH managed the analyses of the study and the literature searches. Both authors revised the manuscript in line with reviewers' comments. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has questioning origin in Wuhan, an industrial city of China. The novel coronavirus 2 (NCV2) was first identified in December 2019, and World Health Organization (WHO) declared the outbreak a global public health emergency on 30 January 2020, officially named it as COVID-19 on February 11 2020, and a pandemic on 11 March 2020. COVID-19 causes physical and mental health problems of variable severity and outcomes among people around the world.

Objective: This study has two aims; 1) to conduct a scoping review of COVID-19's epidemiological trend, clinical manifestations, therapeutics, diagnosis, and progress on vaccine development; and 2)

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to describe a case series of ten consultees' and conveniently selected five family units' mental and physical health effects of COVID-19 over the past 9 months, December to August 31, 2020.

Methods: We used keywords and Boolean Operators for conducting electronic searches of published literature in three largest databases on COVID-19 and regularly received notifications from COVID-19 resource centers, scientific journals, international and national research and economic institutions, and various websites, which helped to retain 82 articles after iterative screening for this review. In addition, 10 cases and the heads of 5 family units were interviewed virtually for assessing the mental and physical health of all family members affected by COVID-19.

Results: COVID-19 pandemic presents with variable clinical manifestations and outcomes attributable to the persons' immune system, age and gender, physical and mental comorbidities, and adversely affects the biopsychosocial, cultural and economic fabrics of the world population. Basic preventive precautions and nonspecific drug interventions against COVID-19 are relatively effective with inconstant morbidity and mortality, and vaccine development researches (phase I-III) are in progress around the world. All persons in case series, not corona positive except one, presented with mental and physical health problems of wider nature that required integrated treatment interventions while majority of family unit members were less affected mentally or physically by COVID-19 and improved with preventive precautions.

Conclusion: COVID-19 is highly virulent disease linked with variable mental health problems, greater morbidity and mortality, severe strains on healthcare organizations and economic downturn around the world. Despite difficult access to services, overall our case series and family members showed good outcome. Information concerning COVID-19 is continuously evolving and, hence, further scoping reviews, randomized clinical trials and surveys concerning its several perspectives are needed in Saudi Arabia and elsewhere in the Gulf countries.

Keywords: Severe acute respiratory syndrome coronavirus-2; COVID-19 pandemic; physical and Mental health; prevention strategies; medication interventions; case series and family units.

1. INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged from Huanan Seafood Wholesale Market in Wuhan an industrial city of China in December 2019. World Health Organization (WHO) coined the term COVID-19 on February 11 2020, and declared COVID-19 as pandemic on 11 March 2020 [1,2]. The novel coronavirus 2 (NCV2) belongs to genus Betacoronavirus closely linked to the SARS-CoV-1 virus, and the International Committee on Taxonomy of Viruses officially named it "severe acute respiratory syndrome coronavirus 2" (SARS-CoV-2) [3]. According to conspiracy theories, SARS-CoV-2 virus began to infect people of Wuhan since August-September 2019, a top-secret possibly kept hidden by Chinese highest administrative authorities. The Chinese doctor who 'whistle-blowed' this information on December 27 was the victim of COVID-19. The shocking news of SARS-CoV-2 outbreak spread like wildfire around the world. The entire Wuhan city was completely lockdown and no one was allowed to travel outside its borders. The international social media projected worldwide political blame games and rhetoric concerning SARS-CoV-2, which is a "Chinese virus and hidden one, and no one can see it". Similarly,

disinformation such as it is an engineered virus in Chinese labs spread around the world. The first case of novel coronavirus 2 (NCV2) outside China was reported in Thailand on January 8, 2020. Thereafter, COVID-19 epidemic declared as pandemic, as it travelled using genuine passport to all countries of the world, and globally unleashed unimaginable devastation to human and economic capital. Simultaneously, global scientific health research organizations began to publish at a greater pace their empirical data and guidelines concerning primary prevention and treatment of COVID-19 in thousands of scientific journals worldwide [1,4-6]. Overall, COVID-19 is a dangerous, and killer infectious disease and people must take it seriously.

This study aimed to review critically published English literature concerning epidemiological trend, clinical manifestations, diagnostic tests, medications, and outcomes of COVID-19 and progress on vaccine development. In addition, to report a case series and conveniently selected five family units with a special focus on mental and physical health effects of COVID-19 over the past 9-months, December to August 31, 2020. The relevance of this pilot research is that it describes, using virtual means, the local

scenarios of mental and physical health of consultees and interviewees in Saudi Arabia settings. This study will create awareness about the medical aspects of patients with COVID-19 among mental health professionals (MHPs) and possibly help develop liaison services with physicians.

2. METHODS

2.1 Search Strategy

For the past many years, we signed up or subscribed for receiving regular notifications and updates from many scientific journals that were the sources of scientific information about COVID-19. In addition, using keywords and Boolean Operators, electronic searches of PubMed, Google Scholar and ScienceDirect were conducted for retrieving most read articles concerning COVID-19. The keywords included novel coronavirus2 OR severe acute respiratory syndrome coronavirus 2 (SARS-Co-V2) OR COVID-19 pandemic AND post COVID-19 effects AND mental health OR physical health OR risk factors OR clinical manifestations OR complications OR screening test OR diagnosis OR vaccines OR prevention OR medications OR outcomes OR mortality OR economic impact OR politics. The search strategy and the keywords were modified as appropriate according to the searched database. However, we have listed (Table 1) other main resources of knowledge concerning several perspectives of COVID-19 since its outbreak in Wuhan City in China, December 2019. In addition, references included in full text articles that focused mainly on COVID-19 were also reviewed for inclusion in the scoping review.

2.2 Search Results

Hundreds of thousands articles concerning COVID-19 were retrieved and reviewed by two independent researchers. Our focus was on full articles describing COVID-19 along with its concise narratives including history, risk factors, screening and diagnosis, morbidity and mortality, prevention and management strategies and outcome. These articles were reviewed critically and the brief sketches of important contents were incorporated in this scoping narrative review. The additional inclusion criteria were free access to full articles, papers containing salient features of NCV2 along with its impact on physical and mental health of the people. All types of studies such as descriptive studies, systematic reviews, meta-analyses, randomized clinical trials,

observational studies, editorials and short communications were included for this review. Screening of retrieved records excluded more than two thousand papers. More than six hundred records were reviewed for eligibility purpose. After removing duplications, unrelated articles, articles cited in systematic reviews and meta-analysis, full articles not accessible and unrelated information, 98 articles were left for further review. Finally, two reviewers agreed to include 82 published studies and 23 new articles were added after reviewers' comments (Fig. 1).

3. RESULTS

3.1 COVID-19

History of viral infections' epidemic-pandemic-endemic cycle evidenced their devastating impact on mental and physical health, global economy, and societal harmony, and linked with a greater number of deaths, widespread violence and protests, and polarization in communities and races around the world. COVID-19 echoes earlier chaotic pandemics such as Flu of 1918 in most catastrophic ways. Mental and physical health are severely affected and several medical diseases and variable new symptoms have been evolving during COVID-19 pandemic attributed to viral virulence, individual and environmental risk factors (Table 2). Death rate is higher mostly in males and elderly persons (+60 years) with various risk factors including cancers [1,4-7, Table 3]. Notably, COVID-19, a multisystem disease, also affects fetus through vertical transmission and newborn babies, and young children and adolescents who like adults present with more or less similar clinical manifestations, physical and psychological diseases, and complications involving multiple vital organs of the body [8-23]. Kawasaki-like disease is also reported in children during COVID-19 pandemic and its incidence is increasing [24,25]. Surprisingly, kids have higher coronavirus load in their noses compared to adults. In similar tone, Fauci said in an interview with Medscape Editor "But I've never seen a pathogen, and in this case a virus, with such an amazing spectrum of disease severity, going from 20% to 40% of the people who are infected having no symptoms, disproportionately leaning toward younger people. Fauci declared that the virus is a formidable foe. Younger people are part of propagation of pandemic and their CT scan series showing lung damage in a significant proportion (50%), and post-viral symptoms emerge and persist like myalgic encephalomyelitis/chronic fatigue syndrome".

Wise to know that the symptoms of COVID-19 differ in non-hospitalized and hospitalized patients globally. Reportedly, recovered patients from NCV2 could be re-infected as shown on retesting, and attributed to residual non-pathogenic (and pathogenic) corona particles, and re-infected patients need quarantine for 2-weeks. This means that antibody response is time limited (three months or so) and does not produce permanent immunity against COVID-19. The National Institute of Health suggested that the positive retest in symptomatic patients means a potential for recurrence of active disease needing immediate treatment intervention and preventing virus transmission to other persons. However, CDC advised that there is no need to repeat testing multiple times in recovered patients but repeat testing is advisable for critically ill patients and individuals with immunosuppression or having immune deficiency diseases [4]. Predictably, COVID-19 testing will also include screening for flu in near future. COVID-19 virus has been infecting several animals. Nature Briefing reported on July 28, 2020 that NCV2 infection rates in cats and dogs mirror those of people. For more details on SARS-CoV-2's epidemiology, molecular and serological results, antibody responses, diagnostic testing and related guidelines, see these resources [26-31]. Overall, the information concerning epidemiological trends and prevention measures, risk factors, clinical

manifestations including psychological, diagnostic testing, multiple organs involvement, and outcomes of COVID-19 are invariably evolving every day and predictably its end may take longer time than expected earlier.

Evidently, COVID-19 is the most virulent pandemic associated with variable morbidity and mortality across the world. COVID-19 differs from typical acute respiratory distress syndrome (ARDS) linked to sepsis, inhalation of harmful substances and pollutants, breathing high concentrations of smoke or chemical fumes, aspirating vomit or near-drowning episodes and severe nosocomial viral and bacterial infections. The novel coronavirus 2, a single RNA virus, can infect newborn infants, children, young adults, middle age and elderly persons with variable presentations and outcomes. Current research suggest that the severity of COVID-19 is probably more severe in children and elderly population than in adults attributed to a variety of risk factors including comorbidities. COVID-19 reported more frequently in males than females attributed to multiple hormones that protect the latter group. The reported epidemiological trends and outcomes globally, central to the management of COVID-19, currently inform that this pandemic will stay for longer time and will need special management strategies including prevention measures, development of specific medications and vaccines.

Table 1. Main resources of data on COVID-19

1. Journal American Medical Association,	18. World Health Organization. Coronavirus disease (COVID-19) outbreak
2. The Lancet-Global Health,	19. Cell Journal,
3.COVID-19 resource Centers associated with various journals and publishing houses	20. Press Coronavirus Resource Hub
4. Neurology and Psychiatry,	21. Elsevier's Novel Coronavirus Information Center,
5. Science,	Elsevier Coronavirus Research Hub,
6. British Medical Journal,	22. Psychiatric Times & Harvard Medical School
7. The Economist,	23. National Institute Health Research (NIHR),
8. News Medical Life Sciences,	24. USA Food and Drug Administration (FDA),
9. Foundation Biomedical Research/Smart Brief,	25. American Psychiatric/Psychological Associations
10. Medscape (Psychiatry, MedPageToday Daily, Weekly Review, Second Opinion, and Quick Quiz and On the Case MedPage Today),	26. Nature Research,
11. Springer Publishing,	27. World Bank Newsletter,
12. Dove Medical Press,	28. Science Daily,
13. Nasem Health and Medicine Division,	29. The Science Advisory Board,
14. National Academies	30. Social media Channels-Facebook, Twitter, LinkedIn, and Instagram
15. Covid-19 update and Neurology Update,	31. Science Domain International
16. Centers for Disease Control and Prevention (CDC),	32. Translational Psychiatry
17. Nature Briefings,	33. eMediNews/Nexus and others.
	34. Many other resources.

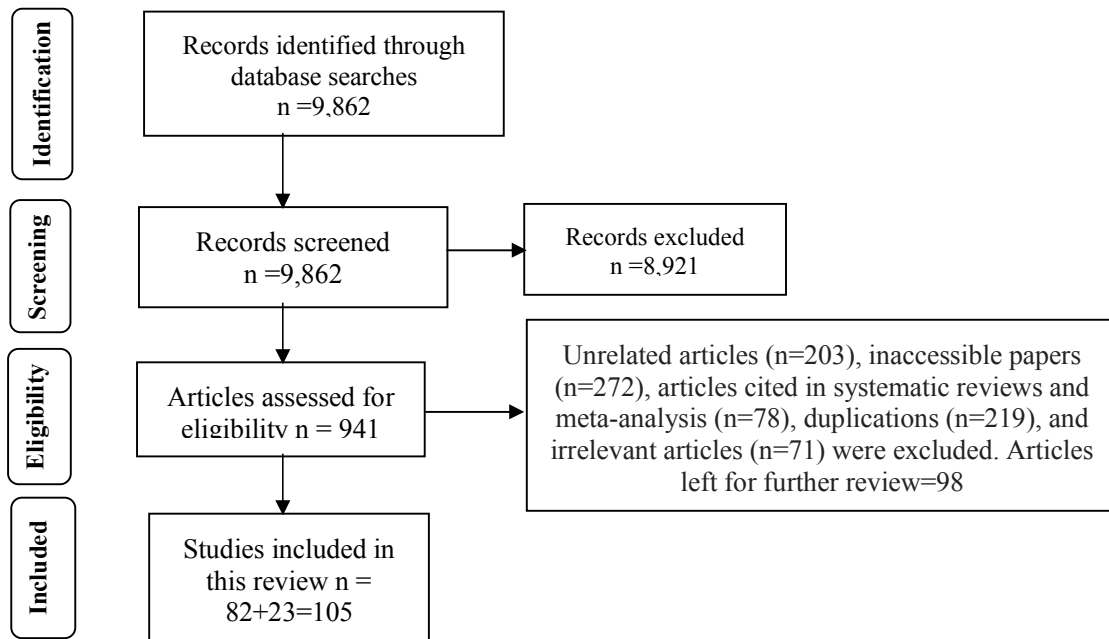


Fig. 1. PRISMA Chart summarizing the flow of search results

Table 2. Body systems and manifestations of COVID-19# [32-42]

Body System & Covid-19	Clinical manifestations S/S	Remarks
Respiratory	Dyspnea, chest pain/heaviness, dry cough, pneumonia with x-ray and imaging signs, and associated S/S of chronic obstructive lung diseases	Diffuse alveolar damage in the acute and organizing phases and focal pulmonary micro thrombi. NCV2 mostly seen in pneumocytes and tracheal epithelium and causes pneumonia, pleural effusion, fibrosis, puncture and lung failure.
Cardiovascular	Heart injury, cardiac arrest, heart failure, cardiomyopathy, myocardial inflammation, pericarditis, Native T1 (fibrosis) and T2 (edema), and other chronic CV complications, during and 70 days post-recovery.	Lymphocytic myocarditis! Arterial and venous thrombosis. Cardiac risks increase with COVID-19 disease due to stress, fear, physical distancing and being restricted at home, and people in medical disability institutions, nursing homes & elderly homes are affected mostly
Gastrointestinal	Nausea, vomiting, diarrhea, abdominal pain, intestinal sounds, bloating abdomen.	COVID-19 patients may present with abdominal symptoms alone. Acute pancreatitis may occur in about 17% of patients with COVID-19.
Hepatic	Raised levels of transaminase enzymes and other S/S of liver injury and failure	Like other organs, liver injured by COVID-19 inflammation. Jaundice may also occur.
Skin (dermatology)	Bullous lesions at foot and red patches at nose, and skin purpuric rashes indicate hypercoagulable state	Skin lesions (livedoid and purpuric rashes) were found in only some cases, indicators of cutaneous thrombosis (& lung emboli) in COVID-19. Post-COVID-19 cutaneous manifestations may be due to steroid.
Ophthalmic	Red eyes, itching and tears flow, and drooping of eyelids, and S/S of conjunctivitis	COVID-19 can enter in the body through eyes and spread to other organs including brain. Covid-19 may lead to myasthenia gravis.

Body System & Covid-19	Clinical manifestations S/S	Remarks
ENT	Sore throat, changes in smell and taste, rhinorrhea, nose congestion, and covid-19 in middle ear and mastoid. Concerned HCPs might be at higher risk for COVID-19.	Inflammatory olfactory neuropathy reported in one patient with COVID-19. Nasal saline irrigation is beneficial in COVID-19. Gum diseases increase the risk of COVID-19, which may cause lesions in mouth.
Urinary tract/Kidney/ Nephrology	S/S of acute kidney injury and failure in ICU patients (in 50%) along with sepsis and molecular changes including higher level of creatinine.	ACE 2-receptor molecule found in high concentration in kidneys (and other organs) used by virus to enter into the cells and damages kidneys and other organs. 5% to 10% patients need dialysis
Mind/brain (CNS)	Headache, dizziness, fatigue, severe weakness, irritability, loss of smell and/or taste, delirium (9%) and stroke (6%).	Fever or chills, delirium, encephalitis and coma, insomnia, depression, anxiety, panic disorder, OCD, psychosis, alcohol and drug abuse, smoking and suicide.
Immune system	COVID-19 knocks down immune defenses of host by using IL-6	Leads to widespread severe hyperinflammation in the body and organ failures. Other game players included IL-1Beta & TNF sky high in critically ill patients with NCV2.
Joint, ligaments and bones	Myalgia, joint pain and body weakness	Aches all over the body
Blood	Blood clots formation and thrombosis seen as complications*	High blood sugar concomitant finding and blood cells especially lymphocytes numbers decrease significantly.
Lymphatic system	Lymphatic system as entry media to different organs including brain	COVID-19 enters in the brain and spread throughout the entire brain using lymphatic system. COVID-19 destroys lymph nodes and spleen, defenders of immune system

COVID-19“long hauler” may last 120 days or so; *Virus progressively attacks the cells lining of the blood vessels. Inflammation increases clots formation that run throughout the body. The result is wider damage to and infarction of multi-organs. Autopsy of heart revealed no NCV2 and damage may be due to inflammation and out of control interleukin or cytokine storm (now shift to bradykinin storm), which normally clear up the infected cells; Coronial autopsies identified these indirect effects; ACE=angiotensin converting enzyme

Table 3. COVID-19 and risk factors (& comorbidities) linked with highest morbidity and mortality

1. Hypertension,	14. Chronic joint diseases such as rheumatoid arthritis and osteoarthritis,
2. Diabetes mellitus,	15. Other autoimmune diseases such as Hashimoto’s diseases
3. Obesity,	16. Vitamin deficiencies (A, D, C and B12)
4. Gum diseases (periodontitis),	17. Patient on immunosuppressant
5. Parkinson disease,	18. Women with complicated pregnancies
6. Multiple sclerosis,	19. Metabolic syndrome
7. Alzheimer’s disease & other dementias,	20. Multiple comorbidities including chronic liver diseases
8. Various cancers including lymphoma	21. Troponin level
9. HIV infection,	22. Chronic physical disabilities
10. Influenza/Flue (Twindemic) may co-occur with NCV2,	23. Chronic psychotic disorders and
11. Chronic obstructive lung diseases	24. Others including testosterone deficiency and Neanderthal heritage
12. Chronic addictions including smoking	
13. Number of comorbidities	

The studies of coronaviruses in various animals especially bats (and humans) and intermediate host pangolins are intriguing and so their classification. The three RNA families are Coronaviridae, the Arteriviridae and the Roniviridae concerning the order Nidovirales, containing pathogens of bats and human and birds and insects and other animals. The Coronaviridae family has two subfamilies, Coronavirinae and Torovirinae, the latter causing enteric infections of certain animals such as horses but not of humans. Members of the subfamily Coronavirinae include the following four genera: Alphacoronavirus, Betacoronavirus, Gammacoronavirus, and Deltacoronavirus identified in humans and different animals. Dozens of new Coronaviruses that caused human respiratory infections over the past one decade probably emerged from ancestral bat viruses [43]. The scientific research have found that coronaviruses have potential to infect humans with devastating consequences, and viruses might have been possibly circulating in bats for many years. Researchers compared the genetic make-up of the coronavirus that causes COVID-19 to related bat viruses and found that one of the closest known ancestors of SARS-CoV-2 emerged in these animals between 40 and 70 year ago. Recent reports suggest that SARS-CoV-2 disguises its own genetic material to infect body cells and further facilitate infection-cum-inflammation in host. Thus, SARS-CoV-2 virus promotes its rapid replication in host cells and causes hyperinflammation, as revealed by structural details of proteins on the surface of the virus [44]. Nature Communications reported on July 14, 2020 about angiotensin converting enzyme (ACE), which could be an important target for antiviral drug development (ACE inhibitors). The recent mechanism how it paralyzes host immune system revealed in *Science* on July 17 is through a SARS-CoV-2 protein, N-terminal nonstructural protein 1 (Nsp1) that plays a major destructive role against the host immune defenses. The Nsp1 specifically shuts down host protein production, blocks immune functions and, consequently, hyperinflammation develops in the host body. Overall, the Nsp1 is a strong killer of people with weak immune defenses. Another important factor concerning COVID-19 is viral load a normal person accidentally gets from an infected person, higher the dose, the worst the outcome. However, the viral load of COVID-19 varies across patients may be attributed to timing of sample collection, severity of infection and fast occurring mutations in the virus [45]. Besides

using personal protection equipment (PPE), frontier health care professionals (HCP) must approach carefully to severely ill COVID-19 patients who could be highly infectious to transmit the virus through coughing and sneezing.

COVID-19 is a powerful polarizer. In fact, this pandemic has divided nations, races and ethnicities, gender, national and international migrant workers concerning its epidemic-pandemic-endemic trends around the world. Therefore, the responses to preventive measures, unspecific treatment interventions, morbidity and mortality (3%-7%) and overall outcomes are invariably variable across the board [1]. Nature briefings quoted as "the pandemic has created one more crisis, and as each day passes the risk of ethnocide becomes more real". This pandemic also caused PPE crisis, and food supply chains disrupted worldwide and mostly poor people in low-income countries are its main victims. Mental health (MH) crisis due to COVID-19 pandemic is also on horizon. Wisely, preventive measures are better than drug interventions specifically about SARS-CoV-2 as no specific drugs are available against COVID-19 disease and its complications, though thousands of pharmaceutical companies and research organizations are engaged globally to develop specific drugs and vaccines [46, Table 4] by studying its genomic structure and mutations (genomic recombination) for the past nine months. Each individual has unique genetic structure and, therefore, genetic variants are reported among young people with COVID-19. Most importantly, mutations allow virus to elude neutralizing antibodies. Scientists suggested that treatment 'cocktails' of multiple neutralizing antibodies, each recognizing a different part of the spike protein could stop the virus from evolving resistance as reported in Nature Briefing. Researchers have also described the molecular underpinnings of COVID-19 in some families and revealed toll-like receptor mutations concerning hyper-inflammatory response. A SARS-CoV-2 variant carrying an amino acid change, D614G, in the spike protein has become the predominant form of the virus in the current global pandemic and be targeted for developing specific drugs or vaccines. However, the gold standard for a vaccine, not impacted by mutation in the virus, is to induce a response that is at least as good as natural infection, reported by Medscape. In the same context, a recent publication in *Cell* advocated for viral surveillance to aid in the

development of immunological interventions also highlighted by Science Advisory Board. Overall, COVID-19 pandemic is a highly virulent infectious disease that affects all aspects of human life, and all people must take necessary preventive measures to curtail its transmission and death rate across the globe.

Table 4. Main pharmaceuticals, research organizations and countries related to vaccine development against COVID-19#

Main mechanisms underlying COVID-19 vaccines development*	Country & Company/Research organizations	Remarks
1. A viral-vector vaccine	University of Oxford & AstraZeneca, UK. Second time paused clinical trial due to adverse events, one time unrelated to vaccine and second time cause yet to be decided	It harnesses a genetically modified adenovirus that causes cold in chimpanzees and expresses the coronavirus spike protein. Antibodies and T-cell production in phase I trial of human participants.
2. A viral-vector vaccine	China and CanSino Biologics	It uses a modified human adenovirus.
3. An RNA-based vaccine**	Germany BioNTech & Pfizer	It relies on mRNA that synthesizes a crucial part of the coronavirus called the receptor-binding domain.
4. An RNA-based vaccine**	USA & Moderna	In collaboration with US NIAID.
5. COVID-19 vaccine based on peptide nanofibers tagged with antibodies	USA	Concept development and could be an effective vaccine against COVID-19
6. NVX-Co373 vaccine candidate	USA Novavax	Partnership with Japan Takeda Pharmaceutical
7. Russia launched COVID-19 vaccine (Sputnik V)	Russia, Gamaleya National Research Center of Epidemiology and Microbiology and the Russian Direct Investment Funds	Scientists globally criticized its use due to lack of trials based evidence (untested vaccine).
8. >175 vaccine candidates in preclinical trials and 34 are in clinical trials.	Worldwide including India where eight candidate vaccines are developed and two are in phase II	Eight in final stages/phase III of human trials
9. Passive vaccines with mAbs [47]	Hamster model, COVID-19 and mAbs study conducted in Germany, and published in Cell, September 2020.	Isolated from the blood of recovered COVID-19 patients, useful as therapeutic and prophylactic agents for passive vaccination. Assuming their administration does not trigger unwanted side effects.

**Phase III trial will inform about their immune response that will (or will not) protect against COVID-19; ** The RNA-based vaccines work well in mice and monkey models. Animal testing is key to COVID-19 vaccine and in humans two doses of vaccine work better than one dose; NIAID=National Institute of Allergy and Infectious Diseases: mAbs= Monoclonal antibodies isolated from convalescent plasma.*

#Other than these vaccine developers, many animal and human research institutes are engaged globally for developing the most effective vaccines against COVID-19 For current update, see this resource [46]

3.2 Conspiracy Theories

The origin of NCV2 infection is shrouded in mystery and, like previous virulent pandemics, will remain hidden. It is apparently clear to some extent that this virus originated from Chinese bats to intermediate animal host pangolins to humans. How this dynamic biological cycle is completed, leading to epidemic to pandemic in humans is not well understood, though various theories put forward by Chinese and other scientists around the world. Chinese animal market and surrounding restaurants trade living animals and cooked food made from diverse animals blamed for the cause of the NCV2 pandemic. Chinese people are also reported to eat living uncooked animals might be the source of coronavirus 2. One Japanese noble prizewinner who worked in a laboratory in Wuhan discredited the above conspiracy theories and affirmed that NCV2 engineered in Chinese laboratory. President Trump said, "The virus is Chinese, hidden and no one can see it". Italian researchers who conducted autopsy on patients who died of COVID-19 claimed that *bacteria* rather than virus are responsible for thrombosis and clot formation in arteries and veins, and blood stops flowing compromising oxygen supply to different organs, and recommended use of blood thinners/ anticoagulants, antibiotics and analgesics. However, most nations of the world supported that China is accountable for the current pandemic and, hence, compensate for all people died from this viral disease across the world. However, it would be difficult because COVID-19 infection deaths underestimated from sea to shining sea. Overall, various conspiracy theories, fake news on social media, uncertainties about evolving crisis spikes and flattening, drug trials failures or weak evidence, burgeoning of traditional and spiritual practices, and mistrust of medical research organizations and absence of well tested vaccines further complicated pandemic scenarios in terms of delay in accessing treatment interventions, test screening and tracing of infected persons. However, Oxford University vaccine development drive (the chimpanzee adenovirus viral vector vaccine-ChAdOx1 in phase I&II trial) and USA (Moderna mRNA vaccine in phase I) and China's efforts (adenovirus vector to deliver a gene encoding SARS-CoV-2 antigen in phase II) and interferon beta look promising but population-specific efficacy and safety questions remain as vaccines progress to phase III trial. Most recent news is that Moderna vaccine mRNA-1273 has elicited robust immune response among all

45 people who received it in a phase 1 study; phase II trial is continuing, and phase III will follow. To all surprise, Vladimir Putin, Russian President launched first coronavirus vaccine, which according to many researchers is untested vaccine and may be dangerously unsafe in humans. Overall, well-tailored mental and physical health campaigns continuously needed globally for reducing public mistrust, political hype statements, false unorthodox medicines claims and conspiracy theories concerning COVID-19 crisis.

3.3 Technology and COVID-19

The advancing technology has two faces: bad and good. The higher rate of mental illness globally, interalia, are due to rapidly advanced technology and evolving innovations. Evidently, social media and smartphones have been creating extreme isolation and alienation among communities. Virtual dissemination of disinformation about COVID-19 has adverse effects on mental and physical health of the people worldwide. MH problems exacerbate or increase in the absence of a unified perception of shared disaster such as highly virulent NCV2 pandemic. COVID-19 is messing up with people MH further aggravated by fear driven social media reporting. NCV2 pandemic and social media have been damaging sociocultural behaviors of the people globally. Social media must report facts based on ethical, scientific and professional analysis of everyday events in the world concerning COVID-19. Look at a wearable tech made Oura ring for early COVID-19 diagnosis is hype or hope but the researchers refuted the claims as unsubstantiated and inaccurate. Technologies help in continuing virtual education at both higher and lower levels benefitting students yet overall students suffer globally due to COVID-19. COVID-19 posits a large number of challenges including access to healthcare services, specific drug and vaccine development. However, computer modeling and biosimulation may help researchers to develop specific drugs and effective vaccines with lifelong immunity against COVID-19. More than 80 candidate molecules (of drugs) being evaluated using model-informed drug development for repurposing to treat COVID-19, and this number will increase in future [48]. Scientists urge that surveillance of a new SARS-CoV-2 variant is necessary because of evolving new information about COVID-19. There appears no earliest end to COVID-19 but technology-oriented research have been helping scientists to discover faster

screening tests, effective treatments and vaccines around the world. According to Prof. Fauci, “half a billion dollars are invested in the RadX, a National Institute of Health (NIH) initiative for coronavirus testing. The aim is to develop a cheap and faster, within five minutes either at home or at healthcare organization, diagnostic test for COVID-19”. More details of sample collection, testing techniques, antigen-antibody responses, molecular markers, various tech devices and other emerging characteristics of persons with COVID-19, see these sources [49-52]. Overall, technological innovations have advanced science of COVID-19, drug development and vaccine research globally.

3.4 Social Impact of COVID-19

In early 19th century and subsequently, coronavirus pandemics had spurred fear on societal and cultural levels, and equally affected adversely home health. On individual level, COVID-19 invariably exacerbates anxiety, fear, and depression, OCD, use of alcohol and other drugs, and psychotic conditions. COVID-19 also causes new MH problems such as low, disturbed mood, sleep disorders, phobias and panic attacks, domestic violence and self-directed violent events including suicide, and psychosis among people. These MH problems have been observed in different communities, societies and races across the world. Does COVID-19 disease infect races in a prejudiced way? Looks like so as death rate reported much higher in Southern States (black community state) than Northern States of USA. To counter awful social media, political hype, biased racial attitudes, and control of COVID-19 transmission, HCP must spread scientifically tailored infection control practices, and candidly help their communities maintain civil codes, be courteous, and uphold rational communication along with debunking misinformation nation-wide. Misleading media reports have suggested that there are 24 times more SARS-CoV-2 infected persons than reported cases by governmental agencies. Whereas CDC countered, our retrospective estimate is that there were 10 times more cases than reported from the period where we have been examining antibody data, March through May 2020.

The biopsychosocial adverse impact of COVID-19 requires multidisciplinary interventional strategies. Based on early detection of signs and symptoms and diagnosis, and prescribed treatments reduce patient suffering and pains resulting in a good quality life. Universal, targeted

and indicated prevention measures decrease stress and related conditions caused by COVID-19. Various means such as provision of employment, financial stimulus, preventing domestic violence, street protests, killings and lootings, easy access to free screening and treatment services, and supplying food packets to daily wage earners could help control spread of COVID-19, and improve social, mental and physical wellbeing of people around the world. Frontline HCP need financial “bonus” and those dying serving COVID-19 patients, their families must get adequate financial compensation and employment to one of the grieved family members. In times of pandemic crisis, police reform and broken mental, social and physical healthcare systems need complete overhauling. Pandemic posits a particular challenge for poor persons with severe mental illness (SMI) lacking insight into their illness (Anosognosia) and they need special institutional care and further details are available here [53]. Pervasive inequality and polarization of races and post-pandemic aftermaths including Sinophobia need special attention and proactive approach for the return of social equality and harmony globally. World funds need to be proposed and should be available for preventing infectious virulent pandemic in future. From benefits perspective, the silver line of COVID-19 is that quarantine and lockdown considerably reduce pollution across all countries of the world and wealthy families and rich corporate become richer. In summary, COVID-19 adversely affects nations, races and religions, communities, social equilibrium, distribution of wealth and foods, civil services, and mental and physical health and healthcare systems, and corruption grows exponentially around the world needing proper and timely management at global level. In fact, COVID-19 is a giant, uncontainable, wild elephant in the vicinity of human population.

3.5 Economic Impact of COVID-19

Evidently, COVID-19 has overwhelmed the world economy. All trading tracks came down to nearly complete standstill including international travels, national flights, ground bus and railway transportations, entertainment outlets, restaurants and hotels, shopping malls, public and private offices, businesses, schools, and universities. Unemployment peaked globally with gross domestic product (GDP) of all countries decreased significantly. Despite inestimable world economic losses, paradoxically pharmaceutical and other trading corporate worldwide benefited greatly from COVID-19, by

selling their over expensive products, such as facemasks, hand sanitizers, eyeglasses (shields), antiviral medications, other repurposed drugs, artificial mechanical ventilators and other related equipment, foodstuffs, and vitamin and mineral supplements. Most governments across the board increased taxes and did not pay the full salaries of employees thus making people highly vulnerable to develop mental and physical diseases. Crimes, lootings and street protests were obvious in most countries. The killing of a black American by a white police officer resulted in widespread protests, not only in USA but also in other nations. Protesters adopted a slogan "black lives matter". Vice President Pence countered "all Americans lives matter". Thus, COVID-19 divided the races such as black African-American/white, Spanish versus white Americans, and its rippling effect also seen in Asian countries. Black Americans and Latinos in Southern states died disproportionately due to SARS-CoV-2 compared to white American in Northern states. COVID-19 also globally discriminated poor people. In sum, COVID-19 shattered economy of the world, trillions of dollars lost in trade, unemployment rate increased, and its net effect unfavorably affected the mental and physical health of all nations.

3.6 COVID-19 and Mental Health

Individuals with previous history of mental disorders are highly vulnerable to develop relapse or aggravation attributed to the overwhelming widespread fear and life-threatening physical conditions globally caused by COVID-19. Most people have been developing mental health (MH) problems due to disinformation and uncertainties regarding COVID-19 origin, prevention strategies and treatment options, and global shortage of PPE. Normal people with vulnerability showed signs and symptoms most frequently of anxiety disorders including panic attacks with or without depression and obsessive-compulsive disorder (OCD), xenophobia, depression with suicidal behaviors, insomnia, acute stress reaction, hysteria epidemic, adjustment reaction, acute psychosis, alcohol and other substance abuse, smoking and non-smoking tobacco products use, and other conditions due to COVID-19. To be precise, not all persons with previously mentioned MH problems may fulfill full diagnostic criteria of Diagnostic and Statistical Manual of Mental Disorders Version V (DSM-V) or International Classification of Diseases-10 (ICD-10). It is not surprising that prolonged (six or

more than six months) exposure to life-threatening trauma of NCV2 could trigger diagnosable anxiety, persistent low mood, fears and obsessions, compulsion of washing hands and bathing among people around the world. People with mental disorders are highly susceptible to NCV2 infection and need scaled up physical and mental health care in integrated settings. Persons with mental disorders and comorbid psychiatric (dual diagnosis) and physical diseases are more susceptible to catch NCV2 infection than the general population attributable to cognitive deficits, lack of personal protection measures and little sense of risk. High-income countries plagued with protests, lootings, shootings, parties in restaurants and at beaches, and congregations in churches demonstrated pathetic response to COVID-19 pandemic with highest infected cases and deaths. As a result, people with or without mental and physical diseases in three democracies of the world heavily suffered and yet there is no solution to this pandemic's spiking infected cases, thousands of deaths and massive economic loss.

The old and new patients with MH conditions (but without COVID-19) need assurances, counseling, psychoeducation and psychotherapy. In addition, these patients may get extra benefits from Artificial Intelligence (AI) programs (Tree Holes Rescue), integrated therapies, and hospitalization in case of impending relapse, and telemedicine. During NCV2 pandemic associated with complete lockdown, the scope of telemedicine/psychiatry, i.e., online MH services has widened globally. Patients with MH conditions showing positive coronavirus test or were in contact with coronavirus positive individual but asymptomatic need simply two weeks' quarantine at home. When mentally ill patients develop moderate to severe COVID-19 need hospitalization in an integrated intervention settings supervised by multidisciplinary team. The outcome of critically ill patients on mechanical ventilators is reportedly very poor; few survive and most die unfortunately. Overall, the switch of survival instinct is in high gear of all people confronting COVID-19 that induces high emotions of anxiety, stress, fear psychosis and real life threat reflecting a mental health crisis across the world.

3.7 Access to Mental Health Services

There are many barriers to access MH services across the world. Marginalized people in terms of

poor people, people of color, people caught in war zones and immigrants face this problem the most and tend to develop significantly a new disorder or exacerbations in pre-existing MH disorders, mostly anxiety, sleep disorder, depression, OCD, acute stress disorder, substance abuse disorders and acute psychotic breakdown. These people are further less likely to have access to treatment interventions during COVID-19 due to the substantial quarantine restrictions and closure of public transport and overpricing of medications and supportive drugs. Corruption strained speedily all healthcare departments and institutions globally further aggravating the difficulties in accessing the mental and medical care. Furthermore, racial discrimination, political polarization, and violent attacks observed in the largest democracies of the world, and targeted those people opposing political rulers. Overall, poor daily wageworkers profoundly suffered from COVID-19 and spread NCV2 infection across the world. Decisive and impartial leadership of political pundits is a necessity in the COVID-19 response and easy access globally to all people in need of any kind of health services.

3.8 Management Strategies of Mental Health

3.8.1 COVID-19 awareness campaign

COVID-19 awareness campaigns disseminate scientific evidenced-based information to public globally. Campaigns help substantially in the prevention of coronavirus infection spread, encourage people to use infection control and immunity enhancing measures (Table 5). Of equal importance is to provide masks and gloves to nonclinical supportive hospital and clinic staff such as cleaners, and kitchen and laundry workers. Public at large should know that not all cloth masks are equally effective. N95 respirator and surgical masks are PPE for doctors in COVID-19 wards and surgical units. The current CDC director Redfield also said, "wearing a mask was a public health issue and that he was "sad" to see it become so politicized" [54]. Public must use masks to effectively control the transmission of coronavirus infection for flattening the curve. NCV2 has on an average 5-6 days' incubation period, which is the time between exposure to the virus and symptom onset, an important message for the public to know. Incubation period can be as long as 14 days. Therefore, campaign organizers should advise quarantine for 14 days for persons exposed to a confirmed

case with coronavirus infection [55-59]. COVID-19 campaigns should also deliver important messages such as stay at home, work from home, eat fresh food at home, stop wildlife trade and unregulated wet markets, and avoid smoking, alcohol and other substances and crowded places such as wedding parties, shopping malls, churches, temples, and mosques. Do not consider frontline healthcare providers as second-class citizens and they need all out support from public, administrators and politicians. Do not attack physically, threat, or kill healthcare workers rather support them in all good and bad circumstances. Frontline doctors need "bonus", safety and security from public assaults, and campaigners must emphasize on this compassionate message during addressing audience and public at large. Expert campaigners should inform patients and public about common psychological reactive responses to coronavirus pandemic, which include sleep problems, high anxiety, fear of catching coronavirus disease, fear psychosis, panic attacks, obsessional ruminations, washing and cleaning excessively. In addition, people may have weird dreams, negative recurrent thoughts, low mood, suicidal thoughts, interpersonal conflicts, desire to increase alcohol and tobacco use, acting-out behavior and social isolation. The patients need to be educated to have adequate sleep, regular meals, regular exercise, stay healthy and positive, connected to friends and family, pray at home, and supplicate Allah (SWT) for the protection of the entire population of the world from COVID-19. Relaxation techniques including breathing exercise and meditation could reduce the stress of COVID-19. MH experts also should inform patients when and where to get help if needed and develop family plan and keep medicine kits at home for dealing with COVID-19. Elderly patients with multiple diseases on several medications should have an independent room in the home with restricted visits by family members. Relatives should stop visiting rehabilitation and elderly centers for patients with multiple diseases. In addition, MH experts recommend public to use the most trusted sources to obtain the latest updated information about COVID-19 for keeping their families safe and healthy, which can also decrease their distress. Healthcare professionals should also spread important messages that people in governance must not polarize races and ethnicities regarding access to COVID-19 services. Otherwise, the racial attitude would mount to infringing the civil rights of the colored people. Awareness campaigns should also

advise people to avoid watching awful social media about COVID-19, which increase their distress tremendously. Notably, correct health information leads to better health. Evidently, early testing of people on large scale and isolating those with positive test for 14 days reduces the serial interval (called serial interval shrank) which is the average time between the onset of symptoms in a chain of people infected by a pathogen. In schools and universities alike, students must use masks even during heat waves to prevent transmission of coronavirus. For detailed information concerning dynamics of coronavirus transmission, see these resources [55-59]. Despite robust campaigns directed towards pandemic crisis, most nations showed trends of spiking cases of infection, re-infection and huge number of deaths [60,61]. Overall, awareness campaigns are important data dissemination tools related to COVID-19 and the real message to public is to take virulent pandemic seriously in all its perspectives.

3.8.2 Healthcare services at three levels

Healthcare system has three levels, primary, secondary and tertiary. Primary healthcare centers (PHC) and integrated with MH (PHC-IMH) and community MHCs (CMHC) provide basic screening, consultation, treatments, interdisciplinary education, and physicians and MH professionals collaborate at three levels. In context to COVID-19, healthcare providers recognize early its stress responses, MH conditions, somatic symptoms (stress-based), physical symptoms and diseases, and offer early

interventions to healthcare clients. During COVID-19 pandemic, rural dwellers need special consideration because their access to advanced medical centers is highly limited due to a variety of reasons including financial issues. Various treatment interventions-drug, non-drug and integrated-concerning psychomedical diseases linked to COVID-19 should enhance persons' mental and physical wellbeing, feelings of safety and security, social connectedness, and the optimism about the current pandemic situation and the future biopsychosocial landscapes around the world. At secondary care level, MH experts can further help mentally ill people needing hospitalization and inpatient treatment. Consultation-liaison services could help both mentally ill people infected with NCV2 and normal persons with COVID-19 who developed mental disorders. These people with complex comorbid conditions need inpatient multidisciplinary services. Similar modus operandi applies to tertiary healthcare services in academic centers or universities. Children need special attention of parents during COVID-19 pandemic. MH experts should encourage family heads to involve children in problem solving, playing indoor sports and video games, which indeed decrease their feelings of distress, fear and anxiety. People need reminders that there are well-defined steps to enhance their wellbeing, self-confidence, and to reduce their feelings of helplessness and hopelessness. Overall, mental healthcare service provisions are essential for all age group of people with NCV2 infection developing mental health conditions and medical diseases.

Table 5. Preventive measures against COVID-19

COVID-19	Remarks
1. Face masks	Short supply globally
2. Keeping social or physical distance of 6 feet	Not strictly followed globally
3. Follow strictly lock down policy	Improper follow-up globally
4. Washing hands regularly with soap for a minimum of 18 seconds	Most people followed it
5. Use of goggles	Only healthcare workers used
6. Use of supplement with vitamins (A,C,&D), zinc and arginine	High prices disabled users
7. Fresh diet, fruits and green vegetables,	Not available to all, supply chain broken
8. Daily 7-8 hours' sleep,	Most people developed insomnia
9. 7-10K steps/day, 5-days/week.	Elderly and disabled not followed
10. 2-weeks quarantine at home	Asymptomatic persons exposed to positive CV person
11. 2-weeks quarantine at medical facilities	When mild symptoms with COVID-19 test positive
12. Healthcare providers at duty times	Must use recommended PPE

Table 6. Drugs used in mild, moderate and severe COVID-19 patients

Drugs used in COVID-19	Properties and uses	Doses(adults) and drug-drug interaction (DDI)	Remark
Remdesivir (RDV)	Antiviral, IV infusion, new drug	RDV 200 mg IV over 30–120 minutes for one dose, followed by RDV 100 mg IV on Day 2 through Day 5 in severe cases and continue similar daily dose for another 5 days if no response.	Some effect against SARS, MERS, and Ebola in cell and animal models. In vitro studies, Remdesivir prevented human cells from being infected with SARS-CoV-2. In human trials, severely ill, admitted patients needing oxygen and ventilator, fast recovery and fewer death rates reported from this drug compared to placebo but no significant effect in COVID-19 patients with moderate severity compared to standard care.
Dexamethasone#	Corticosteroid, IV or oral, used in allergic & autoimmune diseases	6 mg daily for 10 days in severe cases with monitoring for any adverse effects.	Low doses in severely ill patients requiring oxygen and ventilator, less death with quick recovery compared to those who did not receive Dexamethasone, no benefits in less severe patients. Immune system is aberrant.
Hydroxychloroquine	Anti-malarial, autoimmune diseases-RA and lupus	800 mg PO once on Day 1, then 400 mg PO once daily for 4–7 days of total Tx based on clinical evaluation.	Large number of clinical trials reported no effect in severe (or mild) cases of covid-19 rather more deaths were reported due to their cardiovascular adverse effects including in Veterans. Adverse effects: Cardiac, GIT, hypoglycemia, myopathy and allergic rash, anxiety, psychosis, and use in hospital settings and in clinical trials.
Chloroquine	Anti-malarial	1 gm PO once on Day 1, then 500 mg PO once daily for 4–7 days of total Tx in line with clinical evaluation.	Adverse effects: Cardiac, GIT, hypoglycemia, hemolysis, myopathy and rash, use in hospital settings and in clinical trials. Additive effect with AZT and hypoglycemic agents, CYP2D6 and P-gp inhibitors. Dose-dependent toxicity, not use in covid-19 patients except in trial I. Blood test including hepatic and serum minerals, cardiac monitoring, etc.
Azithromycin	Antibiotic used in bacterial infections and <i>in vitro</i> activity against influenza A and Zika viruses but no effect on corona viruses.	500 mg PO once on Day 1, then 250 mg PO daily on Days 2–5. DDI with HCQ and CQ and drugs	Used in combination with Hydroxychloroquine in COVID-19, patients and majority of them cleared corona virus but there was no control group in this trial that cast doubt about its efficacy. Combination resulted in serious cardiac effects. AE are gastrointestinal effects (diarrhea, nausea & vomiting) and hepatotoxicity. Baseline and follow-up ECG, Hepatic panel, Creatinine, potassium, magnesium

Drugs used in COVID-19	Properties and uses	Doses(adults) and drug-drug interaction (DDI)	Remark
Convalescent plasma infusion (immunoglobulin therapy)	Plasma from recovered patients from covid-19 with antibodies, IV	-----	Two studies from China reported equivocal results.
Tocilizumab and other antiviral drugs* (IL-1B antagonist)	Anti-rheumatic approved for RA and JIA It reduces interleukin storm and help in COVID-19but not patients with pneumonia	IL-6 inhibitor, 20 mg/mL, 162 mg/0.9 mL	Block interleukin-6 (IL-6), a protein related to natural immune responses and too much activation of cells by IL results in an IL storm, which knocks down immune system and inflammation flare-up leading to organ failures. Associated with diverse drug-drug interactions (DDI) and adverse effects along with Black Box warning. Ruxolitinib (JAK1/2) inhibitor is shown to improve elderly patients with severe COVID-19
Sarilumab	Similar to Tocilizumab use in RA and off-label in COVID-19	Injectable solution. prefilled syringe 150 mg/1.14 mL, 200 mg/1.14 mL	Works in most severe cases of COVID-19 but reported to fail in Italian study Associated with diverse drug-drug interactions and adverse effects along with Black Box warning especially about serious infection and death.
Kaletra (Lopinavir [LPV] Plus Ritonavir	Used in HIV patients but limited data in patients with novel corona virus. Recently, Kaletra failed in one trial.	LPV/r 400 mg/100 mg PO twice daily for 10–14 days	Kaletra combined with interferon beta-1b and Ribavirin given to patients with COVID-19 who improved faster than those who received only Kaletra. AE: DNV, transaminase elevation, QTc and PR interval prolongation. Lab; HIV antigen/antibody testing at baseline, Serum transaminase levels. ECG monitoring when LPV/r is given with other QTc-prolonging meds. DDI elevation of hepatic enzymes CYP
Oseltamivir	An antiviral medication used for influenza/ flu virus A&B	75 mg twice daily for influenza A&B	Results in COVID-19 patients are not encouraging, In ongoing trials, this is combined with other antiviral drugs.
Favipiravir	Antiviral used in flu, stops viral replication	Day 1; 1000/1800 mg bid and day 2-5, 600 mg/day	COVID-19 patients improve with its high doses as demonstrated by Chinese studies
Umifenovir	Flu medication	800 mg for 5 days (2 capsules qid.	This drug is better than Kaletra.
Galidesivir	A new drug developed for a variety of viral infections	5 mg to 20 mg/kg in phase I trial of human volunteers	Not approved for human use! Soon its trial will begin in some countries. It is an antiviral broad-spectrum drug used in COVID-19.

Drugs used in COVID-19	Properties and uses	Doses(adults) and drug-drug interaction (DDI)	Remark
Sofosbuvir & Daclatasvir	Antiviral used in hepatitis C	400 mg tab orally and 60 mg orally daily	These two antiviral drugs found to benefit patients with COVID-19.
Itolizumab	Antiviral used in India	Anti-CD6 monoclonal antibody, 1.6 mg//kg and each inj. 25 mg/5 ml solution, four vials are needed in a covid-19 patient	Preliminary findings reported from India supported its use in COVID-19 patients.
Colchicine	Used for gout, anti-inflammatory and interferes with cells causing inflammation.	1.5 mg loading dose, then 0.5mg after 60 minutes and then maintenance dose 0.5 mg/twice daily.	It activates anti-inflammatory processes and has anti-mitotic effect. Colchicine works like Tocilizumab in COVID-19 patients dampening IL-6 storm.
Ivermectin,	An oral medication used to treat parasites. As a lotion or cream to treat lice and rosacea.	. Initial infusion 200 mg followed by 100 mg daily for a total of 5 days.	A recent in vitro study found that Ivermectin stops SARS-CoV-2 from replicating.
Coronil Patanjali Kit	As a immune booster	2 Tablets BID	An Indian made dietary supplement hyped for the Tx of COVID-19 patients.
Quercetin	Anti-inflammatory dietary supplement., antioxidant, NACIs	500 mg-1000 mg daily	It may be COVID-19 hype. Advised as adjunct therapy in COVID-19 as a strong scavenger.
Anticoagulants**	Do not allow blood to clot blood in covid-19 patients' arterial and venous blood vessels (endothelium)	Each drug has its own doses regime and used as prophylactic to stop clotting of blood	Use of anticoagulants must continue post COVID-19 phase (blood thinners) but may cause bleeding in the brain as an adverse event in some cases.
Abivertinib	Anti-viral drug	200mg tab//day orally for 28 days	Sorrento Therapeutics (FDA approved) initiates a phase II clinical trial evaluating this drug for Tx of moderate and severe COVID-19patients.
Interleukin-7 (CYT 107) immunotherapy	COVID-19 is lymphocyte killer and immunosuppressant reliever. Uses in lymphopenic patients with COVID-19	IL-7 essential for lymphocyte survival and expansion Antiviral agent. 10ug/kg twice a week for two weeks. Testing dose is 3ug/kg	CD4, CD8 T-cells and natural killer cells, which play antiviral roles are reduced leading to immune collapse, no exacerbation of inflammation and pulmonary injury, lymphocytes return to normal functional level enhance the activity of antiviral agents.

Drugs used in COVID-19	Properties and uses	Doses(adults) and drug-drug interaction (DDI)	Remark
RLF-100	Synthetic vasoactive peptide vasodilates lung as well as penile vessels	a.k.a. Aviptadil	Found effective in critically patients with COVID-19 and used in erectile dysfunctions as well.
Vitamin C	In high doses through various mechanisms	11 g/24 hrs.	Found to help COVID-19 critically ill patients

*RA=Rheumatoid arthritis; JIA=Juvenile idiopathic arthritis; *Affect body's immune system but found of no use: Acalabrutinib, Tofacitinib, Ruxolitinib, Baricitinib, Anakinra, Canakinumab, Apremilast, Mavrilimumab; NACIs=Natural acetylcholinesterase inhibitors used in dementia;** Aspirin (acetylsalicylic acid), Heparin, Warfarin, Rivaroxaban, Dabigatran, Apixaban, Edoxaban, Enoxaparin, and Fondaparinux;#dozens of studies; Based on studies of beta coronavirus, SARS-CoV-2 envelope protein identified as target for antiviral drugs; Avacta & Daewoong partner on COVID-19 therapy- Avacta has expanded its collaboration with Daewoong Pharmaceutical to develop stem cell treatments using Avacta's neutralizing Affimer therapy for COVID-19 patients; other therapeutics include anti-cytokine therapy; Lopinavir/Ritonavir, Ribavirin and interferon beta 1b combination treatment; ACE1 inhibitors/ARBs in hypertension patients to be continued but tend to upregulate ACE2 which facilitate entry of NCV2 to cells of various organs; Hyperbaric oxygen therapy (HBOT), it delivers oxygen under high pressure making tissue uptake more efficient; and Type-1 interferon*

Table 7. Summary report of 10 cases and five family units

Case#	Age(Yrs.) /gender	Marital status	Job	Residence& Nationality	Main symptoms	MH Dx.	Physical Dx	Tx*	Outcome
1.	39 F	Married	Housewife	Buraidah /P	Anxiety & low moods	Panic & Depression	Meniere's disease	Escitalopram and Psychotherapy	Good**
2.	41 F	Married	H/M	Riyadh/Ph	Low mood & insomnia	Depression	None	Passionflower and Amitriptyline	Good
3.	48 M	Married	Computer Technician	Riyadh/I	Depressive symptoms	Depression	Hypertension & Thyroid dis.	Desvenlafaxine, Passionflower & thyroxin	Good
4.	26/F	Married	H/W	Riyadh/I	Anxiety and OCD-like s/s	Anxiety & OCD feature	Pregnancy & seizures	Oxcarbazepine & folic acid	Good
5.	25/M	Married	Car driver	Dammam/I	Vague symptoms	Acute psychosis	None	Escitalopram	Lost for follow-up
6.	41/M	Married	Car mechanic	Riyadh/I	Bodily symptoms & fear	Anxiety and fear	Fever-like symptoms	Paracetamol, MV Supplement	Good
7.	29/M	Married	Computer Tec	Riyadh/I	Flu-like/allergic symptoms	-----	Allergic Rhinitis ?	Paracetamol, MV Supplement & Loratidine	Complete recovery

Case#	Age(Yrs.) /gender	Marital status	Job	Residence & Nationality	Main symptoms	MH Dx.	Physical Dx	Tx*	Outcome
8.	34/F	Married	H/W	Al-Jubail/P	Depressive symptoms	Recurrent depression	Normal pregnancy	Amitriptyline	Good
9.	54/M	Married	Tea boy	Riyadh/S	Fear, anxious	Anxiety reaction	COVID-19+.	Gargle, Quarantine analgesic and antibiotics	Good &travelled to Sudan
10.	42/M	Married	Juice shop	Riyadh/E	Fear and worried	Anxiety reaction	Herpes simplex	Acyclovir	Complete recovery
FU	Head		Family members #	FU brief description	Symptoms	Diagnosis	Comorbid Dis.	Treatment##	Outcome
1. SFU	51/M, No NCV symptoms except tolerable fear		Seven FMs	Parents, four sons & one daughter.	One son with mild OCD after pandemic	OCD-like disorder	Head/F has hypertension and takes med.	Head reassures his son and the family daily. No drug Tx.	Good
2. SFU	42/M & No NCV symptoms except tolerable fear		Five FMs	Parents, &three daughters	Parents have fear of NCV	Fear reaction	No one has any physical or Mental disorder	Head patches up differences in the family	Good
3. SFU	35/M, & No NCV symptoms except tolerable fear		Seven FMs	Parents, four sons & one daughter	All worried about old parents	Bearable Fear in sons	Parents with high B/P & T2DM on med.	Family short discussion. Maternal uncle died of covid-19	Good
4. SFU	42/F, has depression		Eleven FMs	4 elderly, 4 brothers, 2 sisters & 1 son	All worried about older persons	All have fear of covid-19	Older persons have multiple diseases on med.	Interviewee takes drug for depression	Good
5. IFU	45/M Indian having a big home in a village\$		Eight FMs	Parents, five daughters &one son	All worried about corona	feared as cannot go to town	Head has high B/P before COVID -19	On meds	Good
Total#	Head of FU=5		N=38	PA/GP=12, D=12 Son=14,	CV fear =yes/all	Fear reaction in all people	Comorbidities= 5 old patients	family heads on meds=2	Good

*H/M=housemaid; I=Indian, Ph=Philippines, P=Pakistan, S=Sudanese, E=Egyptian; PA/GP=parents/grandparents; *Included Brief psychotherapy in all patients and traditional therapies like warm milk with turmeric powder; FMs=Family members; **improvement; ## exercise, fresh food and prayers common denominators; \$10K people in this village none except one migrant 80-years old woman developed suspected s/s of coronavirus, and others just felt fear when they visit nearby town for shopping*

3.8.3 Management of COVID-19

There may be a number of clinical scenarios related to COVID-19. Patients with old mental illnesses develop relapse or aggravation of their mental conditions. Normal persons show anxiety and fear, low mood, depression, and suicidal thoughts, obsessions, and excessive use of alcohol and other substances, smoking, and fear psychosis. Patients with chronic physical diseases including cancers present with psychiatric symptoms and vice-versa is true. With regard to children, CDC tracked multisystem inflammatory syndrome (MIS-C), a rare but serious condition in association with COVID-19. To familiarize MH experts, this section will include a brief summary of various drugs used in the treatment of COVID-19 [62-76] (Table 6). Each person with COVID-19 needs in-depth interview, laboratory, radiology, and imaging investigations prior to initiation of treatment and prediction of outcome. The severity and various risk factors determine outcomes of COVID-19; multiple organ failure, cancers, diabetes mellitus, hypertension and other comorbidities, severe pneumonia, interleukin storm, and age above 60 years, and only 10% of them survive with available non-specific treatment. Patients who are on mechanical ventilators, dialysis, and immunosuppressant drugs further herald the poor prognosis of NCV2 infection. Notably, complicated pregnancy also predicts poor outcome of COVID-19. Therefore, pregnant women with COVID-19 need special obstetric and gynecological services [77-87]. Evidently, COVID-19 is more deadly than cancers, and neither specific drug nor vaccine is available for patients with COVID-19. Thousands of research institutions and pharmaceutical companies worldwide have conducted clinical trials (phase I, II & III) in patients with NCV2 with variable benefits and results, and yet no well-tested vaccine is on hand. With this info, hype over hope is dominant. Further, researchers worldwide have been repurposing old drugs used in viral infections and other medical diseases for the treatment of patients with COVID-19 [48]. The various drugs used among patients with COVID-19 with variable results are included in Table 6. None of these drugs received FDA approval to use in COVID-19 but Remdesivir received emergency use authorization (EUA and now approval). The FDA created Coronavirus Treatment Acceleration Program (CTAP), aimed at speeding up research for the development of COVID-19 treatments. The treatment for patients

with mild symptoms is to self-isolate for two weeks at home. Severely ill patients need hospitalization receive supportive care, enrollment in clinical trials and administered suggested medications based on hospital guidelines and doctors' clinical judgment. There is no cure or vaccine for COVID-19 at this time except Russia launched first untested vaccine and released into civil circulation. Researchers must conduct more studies to confirm if any of the potential treatments will work for COVID-19. Evolving recent reports suggest that NCV2 infection may spread through airborne and fomites. Overall, COVID-19 pandemic needs earliest ending, and future needs global planning. For the management of COVID-19 cases, frontline physicians should follow these guidelines and recommendations concerning various therapeutics [73,88-95].

3.8.4 Critically ill patients with COVID-19

Patients with severe COVID-19 are extremely challenging and difficult-to-treat cases. For healthcare workers who perform aerosol-generating procedures on patients with COVID-19, the Treatment Guidelines Panel (TGP) recommended using fit-tested respirators (N95 respirators) or powered air purifying respirators, rather than surgical masks. In addition, they should wear gloves, gown, and eye protection such as a face shield or safety goggles (AIII). The TGP recommended that healthcare providers with long experience in airway management should perform endotracheal intubation in patients with COVID-19 (AIII). The TGP further recommended that intubation should be achieved by video laryngoscopy (CIII). For hemodynamic support, the TGP recommended norepinephrine as the first-choice vasopressor (AII). For adults with COVID-19 and refractory shock, the TGP recommended using low-dose corticosteroid therapy to reverse shock over no corticosteroid (BII). For ventilator support involving adults with COVID-19 and acute hypoxemic respiratory failure, use conventional oxygen therapy and high-flow nasal cannula (HFNC) oxygen over noninvasive positive pressure ventilation (NIPPV) (BI). In the absence of an indication for endotracheal intubation, the TGP recommended a closely monitored trial of NIPPV for adults with COVID-19 and acute hypoxemic respiratory failure for whom HFNC is not available (BIII). Furthermore, for adults with COVID-19 who are receiving supplemental oxygen, the TGP recommended close monitoring for worsening respiratory status and that

intubation, if it becomes necessary, be performed by an experienced practitioner in a controlled setting (AII). For patients with persistent hypoxemia, despite increasing supplemental oxygen requirements, in whom endotracheal intubation not otherwise indicated, the TGP recommended considering a trial of awake prone positioning to improve oxygenation (CIII). The TGP advised against using awake prone positioning as a rescue therapy for refractory hypoxemia to avoid intubation in patients who otherwise require intubation and mechanical ventilation (AIII). For mechanically ventilated adults with COVID-19 and acute respiratory distress syndrome (ARDS), the TGP recommended using low tidal volume (VT) ventilation (VT 4–8 mL/kg of predicted body weight) over higher tidal volumes (VT >8 mL/kg) (AI). For mechanically ventilated adults with COVID-19 and refractory hypoxemia despite optimized ventilation, the TGP recommended prone ventilation for 12 to 16 hours per day over no prone ventilation (BII). For mechanically ventilated adults with COVID-19, severe ARDS, and hypoxemia despite optimized ventilation and other rescue strategies, the TGP recommended using an inhaled pulmonary vasodilator as a rescue therapy and if no rapid improvement in oxygenation is observed, the treatment should be tapered off (CIII). There are insufficient data to recommend either for or against the routine use of extracorporeal membrane oxygenation (ECMO) for patients with COVID-19 and refractory hypoxemia. For acute kidney injury and renal replacement therapy, for critically ill patients with COVID-19, the TGP recommended continuous renal replacement therapy (CRRT), if available (BIII). If CRRT is not available or not possible due to limited resources, the TGP recommended prolonged intermittent renal replacement therapy rather than intermittent hemodialysis (BIII). Concerning pharmacologic interventions, the TGP recommended Remdesivir for the treatment of COVID-19 in hospitalized patients with SpO₂ ≤ 94% on room air (at sea level) or those who require supplemental oxygen (AI). The TGP recommended Remdesivir for treatment of COVID-19 in patients who are on mechanical ventilation or ECMO (BI). The TGP recommended using Dexamethasone (at a dose of 6 mg per day for up to 10 days) in patients with COVID-19 who are mechanically ventilated (AI) and in patients with COVID-19 who require supplemental oxygen but who are not mechanically ventilated (BI). The Panel recommended against using Dexamethasone in patients with COVID-19 who do not require

supplemental oxygen (AI). There are insufficient data for the TGP to recommend either for or against any other immunomodulatory therapy in patients with severe COVID-19 disease. In patients with COVID-19 and severe or critical illness, there are insufficient data to recommend empiric broad-spectrum antimicrobial therapy in the absence of another indication. The TGP rating of recommendations: A=Strong; B=Moderate; C=Optional and rating of evidence: I=One or more randomized trials with clinical outcomes and/or validated laboratory endpoints; II=One or more well-designed, nonrandomized trials or observational cohort studies; III=Expert opinion [73,88-95]. Overall, although recommended guidelines for the management of critically ill patients with COVID-19 may vary across the world, the abovementioned guidelines have signatures of researchers associated with highly scientific research organizations and, hence, these guidelines are unmodifiable.

3.8.5 Lessons learned from COVID-19

Evidently, a constantly persistent stress of overwhelming nature produces abnormal psychological and physical problems clearly exemplified by COVID-19. We need guidance by science, but let us remember science does not have black-and-white answers. Guidelines on preventive measures including mask wearing and physical distancing not strictly followed by people at large at the beginning of the pandemic across the world resulted in devastation and deaths. It is wise to rely on news from trusted sources including social media, scientists and politicians and check their credentials. Mental health pandemic has been perceived around the world in terms of rising cases of anxiety and fear, depression, PTSD, sleep disorders, acute psychosis, violence and crimes, increased substance abuse and suicide. People should follow continuing awareness campaigns concerning impact of COVID-19 across the world. People should develop compassionate feelings towards all races. People should build up new social relationships, and at the same time maintain the earlier affairs. Most scientists agree that "Coronavirus 15" is real. People tend to gain weight at home due to lockdown. Resuming physical activity (exercise) and eating healthy food in moderation is a preventive pearl [34]. Patients who recovered from COVID-19 need physical and psychological Rehabilitation and reintegration into society as this pandemic leaves behind residual injuries in their body organs such as heart, lungs, kidneys, liver, brain and psyche

(mind). Socioeconomic and cultural behaviors of people weakened globally. Not every case of fever should direct physicians to think about COVID-19 infection. It is not an exaggeration to say that COVID-19 is by the richest people, for the richest people and of the richest people of the world. Poor people across the board are sufferers and losers. Like HIV and Flu, COVID-19 will continue to evolve and persist in future until scientists develop specific medications and vaccines. Patients with COVID-19 may develop Flu and this Twindemic may posit additional challenges and predict poor outcome.

3.9 Case Series

3.9.1 Clinical vignette 1

This is a 39-year-old married woman from Pakistan who complained of severe anxiety, fear, palpitations, tremors, perspiration, fear of dying and becoming crazy since the beginning of coronavirus pandemic. She also complained of depressed mood, reduced appetite, interrupted sleep, weird dreams, and diverse negative thoughts attributed to COVID-19. Negative thoughts related to death of her husband, herself, brothers, sisters, parents and children by COVID-19 pandemic. She also developed excessive washing of hands, floors, cloths and toilets. When husband will comeback from duty, she will ask him to take off all cloths for washing and tell him to take bath and wear new dress every day. Then she will not allow him to go out even for bringing bread. She visited a number of times emergency services of a local hospital and all the lab investigations and electrocardiogram were normal. She received counseling but no prescription drug. She consulted a psychiatrist and detailed history data collected, and there was no history of mental illness but was diagnosed with Meniere's disease associated with dizzy spells (vertigo) without hearing loss. The consultant diagnosed her with panic attacks with depression and prescribed Escitalopram 5mg at bedtime. In addition, patient received 5 sessions of brief psychotherapy focusing on negative thoughts and emphasis on positive thoughts about her own life and family and life of other relatives. She prays to Allah SWT and supplicates for the safety of all humans from COVID-19 pandemic. Consultant advised her to take warm milk with a quarter of small spoonful of turmeric powder to relieve her insomnia at bedtime daily. Throughout her course of illness, she never developed fever, coughing, generalized body weakness, and dyspnea,

possible markers of COVID-19. At four-month follow-up, she is much better and her panic attacks improved completely with both normal sleep and mood and no worries about pandemic. She has been in touch with our team online off and on, and we tend to clarify her queries especially about COVID-19 and multiple somatic symptoms such as fleeting headache, generalized weakness, and pain in lower limbs, neck ache, and burning sensations in the feet. To address the latter, we informed her that pains lasting for short time are psychological in nature and related to the stress of pandemic and all investigations are within normal limits, so not to over think about such pains. She felt satisfied and at the end of the conversations thanked us.

3.9.2 Clinical vignette 2

This is an adult married maidservant from Philippine working in a Saudi family since few years in Riyadh city. She developed insomnia and weeping spells, and taken to private clinic and was prescribed passionflower capsules (350mg) twice a day. Attending physician advised her to consult MH professional. House woman contacted private Al-Musanada Medical Center and through Zoom App, we interviewed this patient. She reported that she was working nicely prior to covid-19 pandemic, and began to develop diverse symptoms of depression in March 2020. These symptoms were interrupted sleep, terrifying dreams and listening voices during dreaming as if someone knocking the door. She will get up from sleep weeping, crying and running to the house woman for help. In addition, she reported low moods, fear of coronavirus, worried about her own life and her children and other family members including husband in Philippine. She reported no fever, severe headache, dyspnea, and coughing indicators of coronavirus infection. Saudi woman concerned about her mental condition specifically 'she might harm herself', and, therefore, she brought another Philippine maidservant from her sister's family. This patient presented S/S of acute depression and we recommended Amitriptyline 25mg at bedtime along with passionflower capsule 350mg twice a day along with brief counseling. We advised Saudi woman that the patient should talk to the family members in Philippines twice a week. She showed fair improvement with prescribed, integrated medications; and multiple support systems further contributed to her recovery. The patient continued Amitriptyline 25mg/day for two months and then stopped without consulting us. She

relapsed, and her female employer consulted us and we advised patient to restart Amitriptyline 25mg/day and to continue this medication for at least six months. Last follow-up at six weeks, she showed improvement.

3.9.3 Clinical vignette 3

This is a 48-year-old Indian patient who worked as computer office technician in a private company in Riyadh. He lives with his three colleagues in a small room and they help each other in sharing foodstuffs, cleaning house and washing clothes. This patient is a diagnosed case of thyroid disease and hypertension, and takes thyroxin 25 mcg twice daily and amlodipine 5mg daily. The medications stabilized his physical condition. In the past, he had depression and consulted a psychiatrist in India who prescribed him Desvenlafaxine 50 mg twice daily. During interview through Zoom App, he complained of reduced, interrupted sleep, fear of coronavirus, worries about his family in India and depressive symptoms such as low mood, loss of interest in work, loss of interest in daily activities, reduced appetite, irritability and guilt feelings. He related these symptoms to the COVID-19. He developed no sign or symptoms of coronavirus infection such as dyspnea, weakness, or fever, though no screening test was done. We advised him to continue Desvenlafaxine 50mg twice daily along with Passionflower (*Passiflora incarnate*) capsule 350mg at bedtime, a glass of warm milk with small amount of turmeric powder, and brief psychotherapy. We talked to his friends and informed them to look after him and observe him for self-harm behavior. After few days, he went to a private hospital and consulted a psychiatrist who added Olanzapine 10mg/day. This patient responded to combined herbal and modern psychotropic. At last follow-up four weeks ago, he reported his condition is much better except he is over concerned about COVID-19 pandemic.

3.9.4 Clinical vignette 4

This is a 26-year-old-woman from India living in Riyadh city, and reported to have seizure of long duration. She has been taking antiepileptic drugs, Oxcarbazepine 300mg twice daily, Clobazam 10 mg bid and folic acid 400 mcg daily. She was 6-month pregnant and only complained of giddiness off and on. Her brother reported that she had six-month medications from India and it will finish within the next two weeks. She was concerned about the availability of medications in Riyadh. Her only complain was

fear of COVID-19 for the last three weeks. At interview, she reported further about ruminative thoughts about cleanliness, contaminations, washing rituals, and fear of something bad will happen to her pregnancy. At home, her husband and brother supported her as they live together. We advised her brother to visit any pharmacy to buy two uncontrolled medications except Clobazam. Clobazam tapered slowly over three weeks and Oxcarbazepine was increased 300mg three times a day. We regularly counseled her regarding ruminations related to coronavirus. She maintained on medications and has occasional tolerable fearful thoughts of COVID-19.

3.9.5 Clinical vignette 5

This is a 25-year-young Indian driver working for a Saudi Family in Al-Khober since 5 years. About two months after covid-19, he developed sleep disturbance, fearful dreams, inability to work, feeling tiredness, unusual creeping sensations like of a spirit in his lower limbs, variable affect, i.e., spontaneous laughing and period of silence, and hearing hissing voices in both ears. There was no history of physical or mental disorders. He consulted a private hospital in Al-Khober and was prescribed Escitalopram 10 mg at bedtime. He further reported that due to language barrier, he was unable to communicate with the doctor. He took this medication for a few days then sought medical attention with the authors and through Zoom app, we conducted detailed interview of this patient. Besides aforesaid complaints, he also reported weeping and crying spells, highly fearful, psychotic-like symptoms of perceptual-tactile and auditory-disturbances. He also reported that he has appointment with private hospital. We informed him that the attending doctor should discuss possible appropriate treatment with us. However, the patient did not consult us, and he lost for follow-up. Our team of consultants organized a meeting for discussing this case, diagnosed him provisionally as acute psychotic disorder and recommended Amisulpiride 100 mg/day.

3.9.6 Clinical vignette 6

This adult-male car mechanic lives with his friends in a flat. He complained of feeling hotness in the abdomen, sole of the feet, and then the entire body. In addition, he complained of generalized weakness and sense of incomplete burping or belching but no dyspnea. He consulted a private clinic and was prescribed Paracetamol 500 mg three times a day for two

days and then take whenever he feels hotness in his body, Centrum supplement one tablet twice a day and also advised to gargle with warm water. He also mentioned that he is very much afraid of COVID-19, which might have produced these symptoms. He complained of disturbed sleep, negative ideas about death of his family and children and over cleanliness such as washing hands and taking bath. In addition to above medications, we advised him to take daily a glass of hot milk with fresh ginger at bedtime. We also counseled him concerning COVID-19 and assured him that these symptoms do not indicate coronavirus infection and will disappear within few days. Similarly, we informed him to be positive and do not think too much about wife and children, and just talk to them every day few minutes to make sure their wellbeing. At 10 days' follow-up, his fever-like symptoms and tiredness improved but he remained preoccupied with fear of COVID-19. He joined his duty at car workshop. We advised him to stop all medications except vitamin supplement (Centrum) and call us in case of developing medical or mental problems in future.

3.9.7 Clinical vignette 7

This is a 29-year-old married man working in a computer company developed running nose, sneezing, and mild fever and generalized weakness for the past two days, March 2020. He went to a private clinic and physician prescribed Paracetamol 500 mg three times daily, antihistamine Loratadine 10mg daily for seven days, and Centrum Silver one tablet daily for one month. His physical and systemic examinations including respiratory system were within normal limit. He consulted us and reported the previously mentioned symptoms and on further interviewing, he refused having any fear or sleep problem or dyspnea except easy fatigability and weakness. He complained neither sore throat nor dry cough. We diagnosed his condition as allergic rhinitis. We advised him to continue all the above over-the-counter medications for five days. We contacted him on messenger app for follow-up after one week and he showed complete improvement. We advised him to continue Centrum silver one tablet daily.

3.9.8 Clinical vignette 8

This adult married woman reported that she had first episode of mild to moderate depression following death of her close relative, and then she remitted without any treatment. Subsequently, she had two more episodes of

moderate degree of depression, which also remitted without any treatment. Her family is supportive and always navigated her successfully through her depressive episodes in the past. No history of depression is present in her family. Her husband had depression in the past, and consultant psychiatrist prescribed him amitriptyline 25 mg at bedtime and he improved within six months. Presently, he has no depression and works in Al-Jubail. The patient reported that first six months of her second pregnancy went without any problem; she began to show signs and symptoms of mild depression in third trimester, though she delivered normal baby boy at nine months. Then, she developed aggravation of her depression possibly due to lockdown for the past three months. During online interview, she started crying and weeping with suicidal communications, reported irregular sleep, reduced appetite, and exhaustion due to household overwork. She has no maidservant. Her husband is working in a Swiss Company and he does not help her in household work. Everyone including husband thinks that "I am the reason for all my problem and this attitude made my condition worse, doctor". The consultant psychiatrist diagnosed her as a case of recurrent depression, prescribed Amitriptyline 25mg at bedtime, and counseled her and husband who promised to support her in daily work. Regarding COVID-19 and LD impact, she reported fear, anxiety, repeated washing of hands, cloths and cleaning house every day and no outings for the past five months. We advised her to continue amitriptyline 25 mg/day for six months. As advised, husband gave her one tablet after dinner and kept rest of the tablets in a locked cabinet because she reported suicidal ideations. Finally, she was advised for follow-up and at 6-week, she showed good improvement.

3.9.9 Clinical vignette 9

This 54-years-old-person employed as a tea boy in a health organization presented with dry cough with sore throat of about three-month duration. He reported further that he had no fever, dyspnea or weakness and worked normally with adequate sleep. However, he complained of fear of coronavirus, weird thoughts off and on, and frequent low moods. He was regularly doing gargle with warm water mixed with little salt couple of times a day. Some fellow employees including cleaners suspected that he may have mild corona infection and reported to the administrator. He continued to work until when the executive director asked all employees to

take coronavirus screening test. He was only positive for coronavirus. He developed fever with sore throat, weakness, sleep problem, and was urgently transferred to quarantine center. He remained there for two weeks, treated for fever with antipyretic, and he improved completely. Repeat screening test after two weeks was negative. He returned to his place and not allowed to work but stay in his room. After five days, he developed uneasiness in the chest and went to ER of the tertiary care hospital in Riyadh, and received analgesic, vitamins and antibiotics for seven days, and he improved within seven days. During the course of illness, we noticed one thing that he continued to have mild dry cough. When we explored further, he informed that he has this habit since long time even when he has no sore throat or upper respiratory tract infection and it increases during overwhelming stress such as NCV pandemic. We presumed that he has habit disorder, though it does not affect his work. Finally, administration managed get him final exit visa and he travelled to Sudan, and he is in good health with his family.

3.9.10 Clinical vignette 10

This adult person works in a fruit juice outlet in a shopping mall. He consulted one of our team members and complained of single pink-reddish triangular skin patch on upper left side of nose along with burning sensations around his mouth and nose since few days. Further, he reported that it could be due to covid-19 and he is very much afraid of it. He did not take any treatment for this condition, and reported no fever, cough or sore throat or dyspnea. Concerned doctor prescribed acyclovir (Zovirax) cream for applying to the lesion and around the mouth twice a day for five days. Meanwhile we counseled and assured him it is not because of COVID-19. Both burning sensations around mouth and petechial patch improved completely within seven days. Patients benefits from Acyclovir, which is effective in several viral diseases including herpes simplex, shingles and chickenpox. At 3-week follow-up, he improved completely. We do not know whether he was a case of COVID-19, as he did not take screening test for NCV2. However, the probable diagnosis of this case was herpes simplex infection. At 6-weeks follow-up, he was much pleased with the treating doctor and gave a sign of thumb.

3.10 Family Units (FU)

We selected four Saudi families and one Indian family and interviewed head of each family for

assessing the medical and mental health condition of all family members during COVID-19. The purpose was to give tentative insightful differences between consultees and interviewees from Riyadh and an Indian village.

3.10.1 Family unit 1

This family has seven members including parents, four brothers and a girl. Father is employed in a health organization and is known to have hypertension and on Amlodipine 5mg/day. Neither he nor his five children reported any mental health problem attributed to COVID-19 with exception to one son. Exploring his history, father reported that when he was young had some washing rituals, excessive cleanliness, repeating ablution and ideas of contamination, which lasted about five months. Parents told him constantly that the repeated behaviors are not socially acceptable and sometimes mother scolded him not to repeat these acts. During pandemic crisis, his obsessional behaviors especially cleaning rituals reemerged and he was over concerned and fearful about coronavirus. He is not on any medications and parents regularly assure him nothing will happen, to be positive and optimistic. He was encouraged to pray to Allah and supplicate Him for your good health, and protection from COVID-19. He has much improved over the past six months and satisfactorily doing his job. Overall, social isolation and lockdown have caused a great distress in family mental health.

3.10.2 Family unit 2

This family has five members including parents and three young daughters. The head of the family reported that all children are doing fine during COVID-19 but they often express distress about lock down and restrictions on their freedom to move outside home in the fresh air. On top of this, not all kids liked washing and cleaning everything at home including washing vegetables and fruits couple of times. Furthermore, they felt fed up eating homemade food. Although father gave them the freedom to request food from restaurants, they feel disgusted, as they wanted to visit food outlets and eat there. This often led to interpersonal scuffle in the house especially between two parents. Mother is tired of working at home and was unable to visit her family relatives. She was allowed to just saying greetings to her elderly parents from a distance. As a result, she was disappointed and disgraced.

She developed fear of catching COVID-19 though takes care of her children whenever they go out during LD opening hours. The head of family also afraid of COVID-19 and keeps social distance during prayers, wear mask in the office and outside, and no handshake. He attends his duty earnestly and, like all members, he prays to Allah and supplicates for all the members' safety and protection from COVID-19. None of them uses any medication.

3.10.3 Family unit 3

This family unit has four brothers, one sister and parents. Two brothers and sister are married living separately in their homes. We interviewed one of the sons living with his parents and he is employee of a healthcare organization. He reported that my sister and her children along with children of my two brothers are all fine but often express distress of COVID-19. However, all my brothers are fearful and anxious of coronavirus with occasional insomnia. All family folks were highly concerned about the elderly parents who have multiple comorbid diseases might get corona infection. Married brothers and sister along with their children will come for few seconds to our home just to ask about parental wellbeing. No family members gathering allowed in the home since nine months including during lock down relaxation. No other problems reported except his maternal uncle died of COVID-19. All members pray to Allah and supplicate for all the members' safety and protection from COVID-19.

3.10.4 Family unit 4

This family constitutes of 11 members including grandparents, parents and seven adult siblings. Three of the adults, one female and two males are married, and are living independently with their families and reportedly have no medical or psychological problems prior to COVID-19 but developed mild anxiety and fear reaction after pandemic. Grandparents and parents have chronic metabolic and cardiovascular diseases and take related medications regularly and they develop neither any additional medical problem nor psychological reactions after COVID-19. The interviewed woman reported that two of her unmarried brothers and one sister have no psychological reactions concerning coronavirus infections and all of them take necessary precautions when they go out for shopping or buying groceries. All of them pray five times, read holy Quran, and supplicate Allah (SWT) to

protect them from pandemic. She further informed that she has one son, and had mild to moderate depression prior to COVID-19 related to marital problems. Being a clinical psychologist, she was managing her depression by self-counseling, distracting negative thoughts by useful positive activities such as praying and listening holy Quran, dieting and most importantly exercising every day. However, she reported aggravation of depression after complete lockdown and business shut down. Her mental health staff managed with free consultations online using Zoom technology. For depression mixed with severe anxiety and abdominal discomfort, she used Vortioxetine 5mg/day, and improved after seven months, and now much better with good quality of life. Financial constraints and family mental health due to prolonged lockdown and social isolation were her main concerns. Recently, her maternal uncle in sixties, and corona positive admitted to a hospital with cardiac arrest, died. Other family members were screened but were coronavirus negative. Overall, following release of LD, all family members are fine and take basic preventive precautions including using mask, washing hands regularly, and maintaining physical distance when they go out of home for any work.

3.10.5 Family unit 5

This family comes from a village in India consists of eight persons: parents, five daughters and one son. None of them developed any mental health problems as reported by head of the family. Two of them university students and other three girls and son are school going. Since COVID-19 pandemic, universities and schools are closed and they feel boredom at home, though they have no problem to move outside of their home. No strict lockdown observed in this village. No person from this village, a mixed population of about 11 thousand, has suffered from NCV2. However, one migrant nomad has suffered from query COVID-19 and other people are afraid to visit her. In a narrative, more than 45 young workers from this village who sell bed sheets in different states of India stranded in Kerala during pandemic. With the help of Kerala Raj Bhawan administration led by hon. Governor Mr. Arif Mohammed Khan, these workers reached their village safely, and quarantined for fifteen days in a school with the help of Sub Divisional Magistrate and local police on the orders of the Governor of Kerala. No villager suffered from active features of COVID-19. However, COVID-

19 screening tests were not carried out in this village.

In general, people of this village have fear of coronavirus and they are afraid to go to a nearby town that is more populated and crowded. Village dwellers often do not observe social isolation and complete lockdown as they go daily to their farms to work. They even do not use mask in the village. Unlike life in bigger metropolitan cities, families socially well connected in villages and help each other including financial help and food distribution to poor people. However, mild to moderate distress and fear of pandemic persist in every individual in the village but family mental health remains relatively well preserved and intact. Probably village dwellers have good interpersonal relationships, active hardworking lifestyle, fresh food and no stress of faster city life, and no crowd and mostly pollution free environment. All these factors contribute to their immunity being strong and robust and, hence, relatively nadir cases of COVID-19 infection found in villages in India.

4. DISCUSSION

This study described critically evolving clinical data on COVID-19, a public health problem, and its psychological impact on health of the people illustrated by 10 cases and 5 family units in Saudi Arabia. The epidemic of COVID-19 began in China in December 2019 but conspiracy theories suspected its origin about three months earlier in Wuhan city, China. Since then, COVID-19 spread to most countries of the world causing unimaginable destruction in all aspects of human life. Novel coronavirus 2 (SARS-CoV-2), severe acute respiratory syndrome (SARS) and cytokine hyper inflammation syndromes (now Cytokine storm and bradykinin storm) were identified in short period. Aberrant cytokine causes a hyperimmune storm that result in severe symptomatology while human body tries to suppress the virus. Research to find out its underlying biologics and dynamic nature, i.e., genomics, molecular structure, viral replication and other clinical manifestations were in fastest gears around the world. Similarly, researches repurposing non-specific medications and vaccine development against COVID-19 began globally with the greatest pace [48,96,97]. Social media portrayed COVID-19 as to create fear psychosis among people at large. The epidemiological, experimental and translational research landscapes also developed faster due to highly virulent nature of COVID-19 that has been

causing continuous deaths in greater numbers across the globe [1,32,35,36,84]. COVID-19 appetite to death seems insatiable, and this scene may persist in future until an effective vaccine is developed. Evidently, thousands of front healthcare providers managing COVID-19 patients also succumbed to death worldwide. Presumably, the fatality rate of COVID-19 will not flatten soon. Patients with moderate to severe COVID-19 responded to antiviral and other drugs differently across the board attributed to multiple identified risk factors including fast mutations of NCV2 [98]. Thousands of randomized clinical trials involving various drugs conducted in COVID-19 patients also produced variable results, complications and deaths, and several drugs failed completely and out rightly rejected by drug regulators globally [99-101]. The evolution of inconsistent clinical manifestations of COVID-19 further complicated globally the diagnostic, treatment protocols, and guidelines [102]. Overall, variability is a common denominator in all aspects of COVID-19 pandemic possibly attributable to the uniqueness of individual infected person, faster viral mutation, environmental factors and their combination [103].

From public health perspective, preventive measures concerning human-to-human transmission of COVID-19 were declared early on but communities globally ignored such precautions due to many reasons, which include but not limited to unavailability of PPE, misguided political initiatives and public misconstrued COVID-19 virulence. COVID-19 affected adversely not only the sociocultural structure but also the employment and businesses across the world. Finally, the global economy of the world collapsed, and yet massive destructive scenarios of pandemic including human capital appear to have no ends [104,105]. Poor of the poorest, people caught in mini war zones and migrants have been suffering massively due to COVID-19. In pandemic crisis, people of all races and ethnicities need all out assistance including financial stimulus, family supports, medical and psychological care, community support and rehabilitation and integration into the society. Timely help and survival in fact intertwined [106].

Evidently, the COVID-19 has been immensely affecting physical and mental health of the people around the world [41,107]. At physical level, COVID-19 injures all body organs as revealed in autopsy studies from Germany [108]. COVID-19 most significantly affects lungs, heart

and kidneys, by massively attacking and completely knocking down immune system of the body. Either the constant stress of COVID-19 aggravates the preexisting medical conditions of people or they develop new mental health disorders even when they were free from coronavirus infection, as found in our case series. Although not all cases were screened, only one patient was positive for NCV2. Our impression is that people in general have poor self-drive to screening tests for NCV2. All patients responded mostly to integrated treatment, modern medications and traditional therapies including regular prayers. Concerning global mortality (3 to 7%) [1], more than half million people including frontline healthcare providers have died due to COVID-19 and pandemic scourge is likely to continue in future. From MH perspective, COVID-19 has created a psychological crisis worldwide, and produced a variety of psychiatric reactions among people with or without infection as found in our case series and family units [109,110]. Most common features included anxiety reactions, sleep disturbances, fear and panic attacks, obsessive-compulsive like rituals, depression and one case reported psychotic-like symptoms and a female patient reported suicide thoughts [109,110].

Whether or not people develop psychological disorders that meet DSM-V or ICD-10 criteria is debatable. However, we feel that more than 9 months mounting stress of COVID-19 might produce mental disorders or cause relapses meeting international diagnostic criteria as shown by two patients in case series. All cases showed good response to prescribed antidepressants, traditional therapies, brief psychotherapy and family and social supports. Family unit members were distressed and mostly worried about their older parents who had multiple chronic medical diseases, and were on multiple medications. Minor family arguments perceived in most families attributed to prolonged COVID-19 lockdown. Concerning Indian village family, all members were relatively less distressed, morally supported each other, able to move outside home and regularly meet their relatives in the village. However, most people were afraid of COVID-19, and were hesitant to go to the nearby crowded town. Proper guidance from the Governor and timely assistance to transport stranded workers from Kerala State to our village (Kaser Kalan, District Bulandshahr) in Uttar Pradesh helped in controlling COVID-19 spread to other village dwellers. We speculate that the life of village people in India is much better than

life of city people during COVID-19 pandemic, and this perspective needs a targeted study. Special editorial comments about the present study informed that all cases and members of family units in this study probably reflected COVID-19 phobia, a form of coronaphobia, which is a form of anxiety disorder and recently described in the literature [111-112]. Coronaphobia is a mental contagion that manifests with fear. Of course, we know that fear is an adaptive response in the presence of perceived or actual danger. In the present scenario of coronavirus disease (COVID-19) pandemic, fear can become chronic and burdensome and manifests with subjective worry, preferential attention and safety behaviors [113]. COVID-19 phobia appears prevalent thus; it is of clinical importance in psychiatric and GP practices. Mertens et al (2020) used the Fear of Coronavirus questionnaire (FCQ) in an online study and identified four predictors, namely: health anxiety, regular media use, social media use, and risks of loved ones ($R^2=0.37$) [113] of this phobia. Another study that used a modified DSM 5 - Severity Measure for Specific Phobia Adult scale for anxiety in COVID-19 among 6262 participants in Germany observed a good internal consistency ($\alpha=0.86$) and good concordant validity ($r_s=0.60$) [114]. There are no prevalence figures at present but there is a COVID-19 phobia scale [115] that may be employed for initial surveys among selected populations. With growing interest in the mental health impact of COVID-19 pandemic, we should expect more scientific publications that employed specific quantitative tools to assess coronaphobia globally. This descriptive study and scoping review have some limitations. Selection and publication biases concerning review are obvious along with inherent caveats of case series and family units. Another limitation is that research team did not use any questionnaire for interviewing the participants; however, clinical evaluation of each participant was comprehensive. The results of this study also are not generalizable to the general population. The sample selection is convenient and mélange. It is also beyond this scoping review to include all the references concerning mental and physical health effects of COVID-19. However, this study provided the most relevant insights into COVID-19. Further, personal reflections and discussions with community members suggest that uninterruptedly using facemask more than 9 hours causes temporary perceptual disturbances (facemask-induced perceptual syndrome) around covered face. This syndrome has the following

tentative characteristics;1) false sense of still wearing mask; 2) false feeling of boundary lines of facemask; 3) heaviness of the face, 4) reflexively checking the face at least once for facemask presence; and 5) disappearance of false perception of facemask after taking bath with warm water and rubbing the face with hands. This facemask-induced perceptual syndrome is an innovative finding as no other authors have described it in the published literature on COVID-19.

Based on scoping review and case series, we propose some recommendations. The conflicting public health strategies concerning COVID-19 need streamlining globally to curtail transmission of NCV2 infection and its devastating effects. The development of COVID-19 vaccines and specific medications need concerted, scientific efforts of research organizations globally. The performance evaluation in response to COVID-19 at national and international level is mandatory for mitigating the observed weaknesses. Social media must project scientifically tailored reporting about COVID-19. Cost-effective mental and medical healthcare services must be available to people with COVID-19 on equal basis. The public and private healthcare organizations should provide free PPE to frontline healthcare workers and supportive employees. Finally, policy makers in tandem with healthcare providers should strengthen globally community mental and primary healthcare centers together with integrated centers for providing health for all.

5. CONCLUSION

In summary, this scoping review and case series provided broader insights into COVID-19 pandemic and its devastating impact on physical and mental health of people and socioeconomic downturn around the world. People with mental or physical diseases but without coronavirus are vulnerable to the effects of COVID-19 pandemic and present with a cluster of manifestations and they respond well to a variety of integrated treatments, and in general, the life of villagers during pandemic is relatively good. Access to and provisions of healthcare services to all people during pandemic crisis is challenging. In future, mental and physical effects of COVID-19 need further research in Saudi Arabia.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our

area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT AND ETHICAL APPROVAL

Authors obtained oral informed consent from all participants prior to conduct a concise interview and authors anonymized their personal identification information as agreed upon with each participant, and internal ethical committee exempted from written consent seeking due to dangerous outbreak and spiking phases of COVID-19 pandemic. Above all, this study did not involve any risk to the participants.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. World Health Organization. Coronavirus disease (COVID-2019) situation reports; 2020. Available:<https://www.who.int/emergencies/diseases/novel-coronavirus2019/situation-reports/>
2. Chen X, Tian J, Li G, Li Guowei. Initiation of a new infection control system for the COVID-19 outbreak. *The Lancet Infectious Diseases*; 2020.
3. Team NCPERE. Vital surveillances: the epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19). *China CDC Weekly*. 2020;113-122.
4. Centers for disease control and prevention. Coronavirus disease 2019 (COVID-19):

- People who are at higher risk for severe illness; 2020.
Available:<https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-higher-risk.html>
5. Cai Q, Chen F, Luo F, et al. Obesity and COVID-19 severity in a designated hospital in Shenzhen, China. *Preprints with the Lancet*; 2020.
Available:https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3556658
 6. Wu C, Chen X, Cai Y, et al. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Intern Med*; 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32167524>
 7. Vanamoorthy P, Singh GP, Bidkar PU, Mitra R, Sriganesh K, Chavali S, et al. The Neurocritical Care Society of India (NCSI) and the Indian Society of Neuroanaesthesiology and Critical Care (ISNACC) Joint position statement and advisory on the practice of neurocritical care during the COVID-19 pandemic. *Journal Neuroanaesthesiology Critical Care*; 2020.
 8. Sun D, Li H, Lu XX, et al. Clinical features of severe pediatric patients with coronavirus disease 2019 in Wuhan: A single center's observational study. *World J Pediatr*.2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32193831>
 9. Cui Y, Tian M, Huang D, et al. A 55-day-old female infant infected with COVID 19: presenting with pneumonia, liver injury, and heart damage. *J Infect Dis*; 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32179908>
 10. Cai J, Xu J, Lin D, et al. A case series of children with 2019 novel coronavirus infection: clinical and epidemiological features. *Clin Infect Dis*; 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32112072>
 11. Kam KQ, Yung CF, Cui L, et al. A well infant with coronavirus disease 2019 (COVID-19) with high viral load. *Clin Infect Dis*; 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32112082>
 12. Dong Y, Mo X, Hu Y, et al. Epidemiological characteristics of 2,143 pediatric patients with 2019 coronavirus disease in China. *Pediatrics*; 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32179660>
 13. Cui X, Zhang T, Zheng J, et al. Children with coronavirus disease 2019 (covid-19): A review of demographic, clinical, laboratory and imaging features in 2,597 pediatric patients. *J Med Virol*.2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32418216>
 14. Tagarro A, Epalza C, Santos M, et al. Screening and severity of coronavirus disease 2019 (COVID-19) in children in Madrid, Spain. *JAMA Pediatr*.2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32267485>
 15. DeBiasi RL, Song X, Delaney M, et al. Severe COVID-19 in children and young adults in the Washington, DC, metropolitan region. *J Pediatr*.2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32405091>
 16. Chao JY, Derespina KR, Herold BC, et al. Clinical characteristics and outcomes of hospitalized and critically ill children and adolescents with coronavirus disease 2019 (COVID-19) at a Tertiary Care Medical Center in New York City. *J Pediatr*.2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32407719>
 17. Fan C, Lei D, Fang C, et al. Perinatal transmission of COVID-19 associated SARS-CoV-2: should we worry? *Clin Infect Dis*; 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32182347>
 18. Zeng L, Xia S, Yuan W, et al. Neonatal early-onset infection with SARS-CoV-2 in 33 neonates born to mothers with COVID-19 in Wuhan, China. *JAMA Pediatr*.2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32215598>
 19. Chiotos K, Hayes M, Kimberlin DW, et al. Multicenter initial guidance on use of antivirals for children with COVID-19/SARS-CoV-2. *J Pediatric Infect Dis Soc*.2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32318706>;
 20. Royal College of Paediatrics and Child Health. Guidance: Paediatric multisystem inflammatory syndrome temporally associated with COVID-19; 2020.
Available:<https://www.rcpch.ac.uk/sites/default/files/2020-05/COVID-19-Paediatric-multisystem%20inflammatory%20syndrome-20200501.pdf>
Accessed May 28, 2020.

21. Riphagen S, Gomez X, Gonzalez-Martinez C, Wilkinson N, Theocharis P. Hyper inflammatory shock in children during COVID-19 pandemic. *Lancet.* 2020; 395(10237):1607-1608.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32386565>. New York State. Childhood inflammatory disease related to COVID-19.2020;
Available:<https://coronavirus.health.ny.gov/childhood-inflammatory-disease-related-covid-19>. June.2020.
22. Golberstein E, Wen H, Miller BF. Coronavirus disease 2019 (COVID-19) and mental health for children and adolescents. *JAMA Pediatrics*; 2020.
23. Verdoni L, Mazza A, Gervasoni A, et al. An outbreak of severe Kawasaki-like disease at the Italian epicenter of the SARS-CoV-2 epidemic: an observational cohort study. *Lancet.*2020.
24. Toubiana J, Poirault C, Corsia A, et al. Outbreak of Kawasaki disease in children during COVID-19 pandemic: A prospective observational study in Paris, France. *Med Rxiv.*2020.
25. Haveri A, Smura T, Kuivanen S, et al. Serological and molecular findings during SARS-CoV-2 infection: The first case study in Finland, January to February 2020. *Euro Surveill.*2020;25(11).
26. Long QX, Liu BZ, Deng HJ, et al. Antibody responses to SARS-CoV-2 in patients with COVID-19. *Nat Med*; 2020.
27. Okba NMA, Müller MA, Li W, et al. SARS-CoV-2 specific antibody responses in COVID-19 patients. *medRxiv*; 2020.
28. Xiang F, Wang X, He X, et al. Antibody detection and dynamic characteristics in patients with COVID-19. *Clin Infect Dis*; 2020.
29. Zhao J, Yuan Q, Wang H, et al. Antibody responses to SARS-CoV-2 in patients of novel coronavirus disease2019. *Clin Infect Dis.*2020.
30. Rizzo S, Chawla D, Zalocusky K, Keebler D, Chia J, Lindsay L, et al. Descriptive epidemiology of 16,780 hospitalized COVID-19 patients in the United States. *medRxiv*; 2020
31. Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*; 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32109013>
32. Garg S, Kim L, Whitaker M, et al. Hospitalization rates and characteristics of patients hospitalized with laboratory-confirmed coronavirus disease 2019 - COVID-NET, 14 states, March 1-30, 2020. *MMWR.* 2020;69(15):458-464.
33. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019(COVID-19) outbreak in China: Summary of a report of 72,314 cases. From the Chinese Center for Disease Control and Prevention. *JAMA*; 2020.
34. Shi H, Han X, Jiang N, et al. Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: A descriptive study. *Lancet Infect Dis.*2020;20(4):425-434.
35. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet.*2020;10223:497-506.
36. Rogers JP, Chesney E, Oliver D, et al. Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: A systematic review and meta-analysis with comparison to the COVID-19 pandemic. *Lancet Psychiatry.* 2020; 7:611-627.
37. Butler M, Watson C, Rooney A, et al. *BMJ blog: the neurology and neuropsychiatry of COVID-19.*
Available:<https://blogs.bmj.com/jnnp/2020/05/01/the-neurology-and-neuropsychiatry-of-covid-19/>Date:2020
38. Salazar de Pablo G, Serrano JV, Catalan A, et al. Impact of coronavirus syndromes on physical and mental health of health care workers: systematic review and meta-analysis. *J Affect Disord.*2020; DOI: 10.1016/j.jad.2020.06.022.
39. Solomon IH, Normandin E, Bhattacharyya S, et al. Neuropathological features of Covid-19. *N Engl J Med.*2020
DOI: 10.1056/NEJMc2019373
40. Chen Y, Zhou H, Zhou Y, Zhou F. Prevalence of self-reported depression and anxiety among pediatric medical staff members during the COVID-19 outbreak in Guiyang, China. *Psychiatry Research.* 2020; 288.Article 113005.
41. Banerjee D. Psychological preparedness for the COVID-19 pandemic, perspectives from India. *Psychiatry Research.* 2020; 288.Article 112999.
42. Christopher J. Burrell, Colin R. Howard, Frederick A. Murphy. Chapter 31 – Coronaviruses. Editor(s): Christopher J. Burrell, Colin R. Howard, Frederick A.

- Murphy. Fenner and White's Medical Virology (Fifth Edition), Academic Press. 2017;437-446.
43. Black S. SARS-CoV-2 disguises its own genetic material to facilitate infection. Available: <https://www.scienceboard.net/index.aspx?sec=sup&sub=gen&pag=dis&ItemID=1071>
 44. Pan Y, Zhang D, Yang P, Poon LLM, Wang Q. Viral load of SARS-CoV-2 in clinical samples. *Lancet Infect Dis*. 2020; 20(4):411-412.
 45. Craven J. COVID-19 vaccine tracker; 2020. Available: <https://www.raps.org/news-and-articles/news-articles/2020/3/covid-19-vaccine-tracker>
 46. Kreye J, Reincke SM, Kornau H-C, Sánchez-Sendin E, Corman VM, Liu H. A therapeutic non-self-reactive SARS-CoV-2 antibody protects from lung pathology in a COVID-19 hamster model. *Cell*; 2020. DOI: <https://doi.org/10.1016/j.cell.2020.09.049>
 47. De Savi C, Hughes DL, Kvaerno L. Quest for a COVID-19 Cure by repurposing small molecule drugs: Mechanism of action, clinical development, synthesis at scale, and outlook for supply. *Organic Process Research & Development*; 2020;2.
 48. Food and Drug Administration. Coronavirus disease 2019 (COVID-19) emergency use authorizations for medical devices; 2020. Available: <https://www.fda.gov/medicaldevices/emergencysituations/medicaldevices/emergency-use-authorizations/#covid19ivd>
 49. Centers for disease control and prevention. Interim guidelines for collecting, handling, and testing clinical specimens from persons for coronavirus disease 2019 (COVID-19); 2020. Available: <https://www.cdc.gov/coronavirus/2019-ncov/lab/guidelines-clinical-specimens.html>
 50. Centers 2019 (COVID-19). For Disease Control and Prevention. Evaluating and testing persons for coronavirus disease; 2020. Available: <https://www.cdc.gov/coronavirus/2019-nCoV/hcp/clinical-criteria.html>
 51. Guo L, Ren L, Yang S, et al. Profiling early humoral response to diagnose novel coronavirus disease (COVID-19). *Clin Infect Dis*; 2020. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32198501>
 52. COVID-19, Police reform, and fixing a broken mental health system – *Medscape*; 2020.
 53. U.S. CDC head says mask-wearing could get COVID-19 under control within 4-8 weeks; 2020. Available: <https://www.reuters.com/article/us-health-coronavirus-cdcidUSKCN24F2PG>
 54. Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med*. 2020;382(13):1199-1207.
 55. Rothe C, Schunk M, Sothmann P, et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *N Engl J Med*. 2020;382(10):970-971.
 56. Yu P, Zhu J, Zhang Z, Han Y, Huang L. A familial cluster of infection associated with the 2019 novel coronavirus indicating potential person-to-person transmission during the incubation period. *J Infect Dis*; 2020. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32067043>
 57. Bai Y, Yao L, Wei T, et al. Presumed asymptomatic carrier transmission of COVID-19. *JAMA*. 2020. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32083643>
 58. Lauer SA, Grantz KH, Bi Q, et al. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: Estimation and application. *Ann Intern Med*. 2020. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32150748>
 59. Coronavirus; 2020. Available: https://www.psychiatrictimes.com/sites/default/files/legacy/mm/digital/media/03Mar_PTMorganstein_Coronavirus_PDF_V2.pdf
 60. Centers for disease control and prevention. Coronavirus disease 2019 (COVID-19): cases in U.S.; 2020. Available: <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html> Accessed April 9, 2020.
 61. Food and drug administration. FDA cautions against use of Hydroxychloroquine or Chloroquine for COVID-19 outside of the hospital setting or a clinical trial due to risk of heart rhythm problems; 2020. Available: <https://www.fda.gov/drugs/drug-safety-and-availability/fda-cautions-against-use-hydroxychloroquine-or->

- chloroquine-covid-19-outside-hospital-setting-or
62. Best BM, Capparelli EV, Diep H, et al. Pharmacokinetics of Lopinavir/ritonavir crushed versus whole tablets in children. *Journal Acquired Immune Deficiency Syndrome*. 2011;58(4): 385-391. Available: <https://www.ncbi.nlm.nih.gov/pubmed/21876444>
 63. Gilead Sciences. Remdesivir (GS-5734) investigator's brochure. Edition 5; 2020.
 64. Kolilekas L, Loverdos K, Giannakaki S, et al. Can steroids reverse the severe COVID-19 induced 'cytokine storm'? *Journal Medical Virology*; 2020. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32530507>.
 65. Fadel R, Morrison AR, Vahia A, et al. Early short course corticosteroids in hospitalized patients with COVID-19. *Clin Infect Dis*; 2020. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32427279>
 66. So C, Ro S, Murakami M, Imai R, Jinta T. High-dose, short-term corticosteroids for ARDS caused by COVID-19: A case series. *Respirol Case Rep*.2020; 8(6): 00596. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32514354>
 67. Yuan M, Xu X, Xia D, et al. Effects of corticosteroid treatment for non-severe COVID-19 pneumonia: A propensity score-based analysis. *Shock*; 2020. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32496422>
 68. Yang Z, Liu J, Zhou Y, Zhao X, Zhao Q, Liu J. The effect of corticosteroid treatment on patients with coronavirus infection: A systematic review and meta-analysis. *J Infect*. 2020;81(1):e13-e20. Available: <https://www.ncbi.nlm.nih.gov/pubmed/32283144>
 69. Randomized Evaluation of COVID-19 Therapy (RECOVERY). Low-cost Dexamethasone reduces death by up to one third in hospitalized patients with severe respiratory complications of COVID-19; 2020. Available: <https://www.recoverytrial.net/news/low-cost-dexamethasone-reduces-death-by-up-to-one-third-inhospitalised-patients-with-severe-respiratory-complications-of-covid-19>
 70. Horby P, Shen Lim W, Emberson J, et al. Effect of dexamethasone in hospitalized patients with COVID-19: Preliminary report. medRxiv; 2020. Available: <https://www.medrxiv.org/content/10.1101/2020.06.22.20137273v1>
 71. Spinner CD, Gottlieb RL, Criner GJ, et al. Effect of Remdesivir vs standard care on clinical status at 11 days in patients with moderate covid-19: A randomized clinical Trial. *JAMA*.2020. DOI: 10.1001/jama.2020.16349
 72. McFee RB. COVID-19: Therapeutics and interventions currently under consideration. *Dis Mon*. 2020;101058. DOI: 10.1016/j.disamonth.2020.101058.
 73. Rahman O, Trigonis RA, Craft MK, Kruer RM, Miller EM, Terry CL, et al. Corticosteroid Use in Severely Hypoxemic COVID-19 Patients: An observational cohort analysis of dosing patterns and outcomes in the early phase of the pandemic. *MedRxiv*; 2020.
 74. Vannucchi AM, Sordi B, Morettini A, Nozzoli C, Poggesi L, Pieralli F, et al. Compassionate use of JAK1/2 inhibitor Ruxolitinib for severe COVID-19: A prospective observational study. *Leukemia*. 2020;1-3.
 75. Ji P, Chen J, Golding A, Nikolov NP, Saluja B, Ren YR, et al. Immunomodulatory Therapeutic Proteins in COVID-19: Current clinical development and clinical pharmacology considerations. *The Journal Clinical Pharmacology*; 2020.
 76. Centers for Disease control and prevention. Interim considerations for infection prevention and control of coronavirus disease 2019 (COVID-19) in inpatient obstetric healthcare settings; 2020. Available: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/inpatient-obstetric-healthcare-guidance.html>
 77. The American College of Obstetricians and Gynecologists. Practice advisory: Novel coronavirus 2019 (COVID-19); 2019. Available: <https://www.acog.org/clinical/clinicalguidance/practiceadvisory/articles/2020/03/novelcoronavirus-2019>
 78. Society for maternal fetal medicine. Coronavirus (COVID-19) and pregnancy: what maternal fetal medicines subspecialists need to know; 2020. Available: <https://www.smfm.org/covid19>. Accessed April 8, 2020.
 79. Rasmussen SA, Smulian JC, Lednický JA, Wen TS, Jamieson DJ. Coronavirus disease 2019 (COVID-19) and pregnancy:

- What obstetricians need to know. *Am J Obstet Gynecol.*2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32105680>
80. Chen H, Guo J, Wang C, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: A retrospective review of medical records. *Lancet.* 2020;395(10226):809-815.
81. Liu Y, Chen H, Tang K, Guo Y. Clinical manifestations and outcome of SARS-CoV-2 infection during COVID-19 Treatment Guidelines 24 Pregnancy. *J Infect;* 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32145216>
82. Breslin N, Baptiste C, Miller R, et al. COVID-19 in pregnancy: Early lessons. *American Journal of Obstetrics & Gynecology MFM;* 2020.
Available:<https://www.sciencedirect.com/science/article/pii/S2589933320300410?via%3Dihub>
83. World Health Organization. Report of the WHO-China joint mission on coronavirus disease 2019 (COVID-19); 2020.
Available:<https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid19-final-report.pdf>
84. Breslin N, Baptiste C, Gyamfi-Bannerman C, et al. COVID-19 infection among asymptomatic and symptomatic pregnant women: Two weeks of confirmed presentations to an affiliated pair of New York City hospitals. *Am J Obstet Gynecol MFM.*2020:100118.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32292903>
85. The American College of Obstetricians and Gynecologists. Outpatient assessment and management for pregnant women with suspected or confirmed novel coronavirus (COVID-19); 2020;
Available:<https://www.smfm.org/covid19/>
86. The American College of Obstetricians and Gynecologists. COVID-19 frequently asked questions for obstetricians-gynecologists, obstetrics; 2020.
Available:<https://www.acog.org/clinical-information/physician-faqs/covid19-faqs-for-ob-gyns-obstetrics>
87. Nicola M, O'Neill N, Sohrabi C, Khan M, Agha M, Agha R. Evidence based management guideline for the COVID-19 pandemic - Review article. *Int J Surg.*2020; 77:206-216.
88. Hajra A, Mathai SV, Ball S, Bandyopadhyay D, Veyseh M, Chakraborty S, et al. Management of Thrombotic Complications in COVID-19: An Update. *Drugs.*2020:1-0.
89. Stojkovic-Filipovic J, Bosic M. Treatment of COVID 19-Repurposing drugs commonly used in dermatology. *Dermatologic Therapy.* 2020;13829.
90. Wang Y, Liu Y, Liu L, Wang X, Luo N, Ling L. Clinical outcome of 55 asymptomatic cases at the time of hospital admission infected with SARS-Coronavirus-2 in Shenzhen, China. *J Infect Dis;* 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32179910>
91. Centers for Disease Control and Prevention. Interim infection prevention and control recommendations for patients with suspected or confirmed coronavirus disease 2019 (COVID-19) in healthcare settings; 2020.
Available:<https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-recommendations.html>
92. Centers for disease control and prevention. Strategies to optimize the supply of PPE and equipment; 2020.
Available:<https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html>
93. Centers for Disease Control and Prevention. Approved respirator standards; 2006.
Available:<https://www.cdc.gov/niosh/npptl/standardsdev/cbrn/papr/default.html>
94. Alhazzani W, Moller MH, Arabi YM, et al. Surviving sepsis campaign: Guidelines on the management of critically ill adults with coronavirus disease 2019 (COVID-19). *Intensive Care Med;* 2020.
Available:<https://www.ncbi.nlm.nih.gov/pubmed/32222812>
95. Uddin M, Mustafa F, Rizvi TA, Loney T, Suwaidi HA, Al-Marzouqi AH, et al. SARS-CoV-2/COVID-19: Viral genomics, epidemiology, vaccines, and therapeutic interventions. *Viruses.* 2020; 12(5):526.
96. Mehta P, McAuley DF, Brown M, Sanchez E, Tattersall RS, Manson JJ, HLH Across Specialty Collaboration. COVID-19: consider cytokine storm syndromes and immunosuppression. *Lancet (London, England).* 2020;395(10229):1033.
97. van Dorp L, Acman M, Richard D, Shaw LP, Ford CE, Ormond L, et al. Emergence of genomic diversity and recurrent

- mutations in SARS-CoV-2. *Infection, Genetics and Evolution*. 2020:104351.
98. Thorlund K, Dron L, Park J, Hsu G, Forrest JI, Mills EJ. A real-time dashboard of clinical trials for COVID-19. *The Lancet Digital Health*. 2020;2(6):286-287.
99. Bauchner H, Fontanarosa PB. Randomized clinical trials and COVID-19: managing expectations. *JAMA*. 2020.
100. Hannan KS, McKinney WP. An overview of current clinical trials of agents for the treatment and prevention of COVID-19 in the United States. *The University of Louisville Journal of Respiratory Infections*. 2020; 4(1):49.
101. Ozma MA, Maroufi P, Khodadadi E, Köse Ş, Esposito I, Ganbarov K, et al. Clinical manifestation, diagnosis, prevention and control of SARS-CoV-2 (COVID-19) during the outbreak period. *Infez Med*. 2020; 28(2):153-165.
102. Qu G, Li X, Hu L, Jiang G. An imperative need for research on the role of environmental factors in transmission of novel coronavirus (COVID-19). *Environ. Sci. Technol*. 2020; 54(7): 3730–3732.
103. Fernandes N. Economic effects of coronavirus outbreak (COVID-19) on the World Economy; 2020.
104. Available: <https://ssrn.com/abstract=3557504> or <http://dx.doi.org/10.2139/ssrn.3557504>
105. Nicola M, Alsaifi Z, Sohrabi C, Kerwan A, Al-Jabir A, Losifidis C, Agha M, Agha R. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal Surgery (London, England)*. 2020; 78:185.
106. Ji Y, Ma Z, Peppelenbosch MP, Pan Q. Potential association between COVID-19 mortality and health-care resource availability. *The Lancet Global Health*. 2020;8(4):480.
107. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. *The Lancet Psychiatry*. 2020; 7(4):15-6.
108. Wichmann D, Sperhake JP, Lütgehetmann M, Steurer S, Edler C, Heinemann A, et al. Autopsy findings and venous thromboembolism in patients with COVID-19: a prospective cohort study. *Annals Internal Medicine*. 2020;6.
109. Pfefferbaum B, North CS. Mental health and the Covid-19 pandemic. *New England Journal Medicine*. 2020:13.
110. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. *Asian Journal Psychiatry*. 2020; 102066.
111. Wang C, Cheng Z, Yue XG, McAleer M. Risk management of COVID-19 by Universities in China. *Journal Risk Financial Management*. 2020;13:36.
112. Arora A, Jha AK, Alat P, Das SS. Understanding coronaphobia. *Asian Journal Psychiatry*. 2020.102384.
113. Mertens G, Gerritsen L, Duijndam S, Salemink E, Engelhard IM. Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. *Journal Anxiety Disorders*. 2020; 74;102258. DOI: 10.1016/j.janxdis.2020.102258
114. Petzold MB, Bendau A, Plag J, Pyrkosch L, Maricic LM, Rogoll J, et al. Development of the COVID-19-anxiety questionnaire and first psychometric testing. *British Journal Psychiatry Open*. 2020;6(5):1–4. doi: 10.1192/bjo.2020.82.
115. Arpacı I, Karataş K, Baloğlu M. The development and initial tests for the psychometric properties of the COVID-19 Phobia Scale (C19P-S). *Personality and Individual Differences*. 2020;164. Available: <https://dx.doi.org/10.1016%2Fj.paid.2020.110108>.

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