



Review Article

COVID-19 Pandemic- Ethical Challenges for Healthcare Workers Practicing in Resource-Limited Settings

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Abstract

In this review, the ethical issues peculiar to the COVID-19 pandemics and the role of healthcare workers, especially those in resource-limited settings are x-rayed. We contend that there is a pressing ethical issue that needs urgent clarification on the rights and responsibilities of healthcare workers, especially in the current context of COVID-19 pandemic preparedness and responsiveness.

We searched MEDLINE, Web of Science, EMBASE, Google Scholar, PUBMED related articles, newspaper articles, and online news sources for relevant information. The various professional codes of conduct (World Medical Association, Medical and Dental Council of Nigeria) were also consulted.

The ethical principles of equitable distribution of healthcare resources, confidentiality with associated stigmatization, issues relating to duty to care by the healthcare workers and those pertaining to conduct of clinical trials and access to approved therapies or vaccines were highlighted in this study. We agree with the submission that healthcare workers only have a moral duty to treat patients with COVID-19 if the necessary protective equipment and adequate compensation are not provided.

We argue that the duty of physicians and other healthcare workers to care for patients during pandemics such as COVID-19 is obligatory in the absence of required protective equipment and other forms of compensation. There is a need for the government and other stakeholders to put in place a National Pandemic /Epidemic Ethical Framework to address these identified ethical challenges.

Keywords: Ethical dilemma; Duty to care; COVID-19; Healthcare workers; Pandemic; Nigeria.

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Introduction

On the 31st of December 2019, the first case of COVID-19 was reported in Wuhan, China. It has constituted a global health threat following the international spread and accompanying mortality in several countries.[1, 2] With the magnitude of the COVID-19 pandemic, it was subsequently declared by the World Health Organization (WHO) as a public health emergency of international concern on the January 31, 2020.[3] In Nigeria, the first case of COVID-19 was recorded on February 27, 2020 in Lagos and there are 255,190 recorded cases as at March 23, 2022.[4, 5]

The rapid spread of COVID-19 disease took everyone by surprise leading to high number of hospital admissions with unprecedented pressures on healthcare facilities in many countries. Arising from this was the demand for medical triaging for appropriate and ethical allocation of the scarce resources to meet these urgent medical demands. Triage process is the coordinated sorting of patients and health resources to determine who receives what level of medical attention.[6] The debate on ethics of triaging and the right to play “god” by healthcare practitioners is a recurring issue and there are several opinions.[7]

Most healthcare facilities, even in developed countries, could be overwhelmed during pandemics with a worse situation in resource-limited settings due to dearth in infrastructure and the necessary manpower to combat the disease. Hence, physicians and other healthcare workers are sometimes required to make a decision conflicting the individual rights of citizens and overall public health interests. As much as possible, the collective interest would supersede personal gains and right, without compromising patients' rights especially their confidentiality. [8, 9]

Ethical issues are critical to preparedness and response to pandemics, of which lessons from pandemics could form template for ethical safeguards, public health measures without unintentionally violating human rights and values. This can further shape what informs sharing of scarce healthcare resources based on set criteria and priorities with the overall objective of achieving equitable distribution of health care resources. Furthermore, healthcare workers must uphold the principles of good ethical practice vis-a vis respect for patient autonomy, beneficence, non-maleficence, and justice. A review of the physicians' role is necessary for the provision of guidelines regarding professional rights and responsibilities, as well as ethical duties and obligation during an outbreak.[10] This is further buttressed by the international and Nigerian Code of Medical Ethics where physicians are expected to act only in the patient's interest when providing medical care, and be responsible in promoting both individual health as well as the general health of the community employing equitable allocation of health resources as much as possible.[11]

In this review, we addressed the ethical issues peculiar to pandemics and the role of healthcare workers, especially those in resource-limited settings like Nigeria and other African countries. We contend that there are pressing ethical issues that need urgent clarification on the rights and responsibilities of physicians, especially in the current context of COVID-19 pandemic preparedness and responsiveness. Moreover, we propose that such ethical issues would best be clarified using the professional codes of ethics for medical doctors and other healthcare professionals in Nigeria.

Methods

We searched MEDLINE, Web of Science, EMBASE, Google Scholar, PUBMED related articles, newspaper articles, and online news sources for relevant information. The search criteria included “ethics* AND COVID 19 AND physicians AND Africa”; “ethical issues AND health care workers AND COVID 19 pandemic”. Relevant articles retrieved from the search were used for this review. We also consulted the various professional codes of conduct (World Medical Association, Medical and Dental Council of Nigeria) for relevant information. We did not undertake a systematic review but conducted an analysis of available literature in addition to personal and professional experiences of co-authors and other colleagues.

Results

Some of the relevant ethical challenges that may be encountered by healthcare workers during this COVID-19 pandemic are issues to do with just and equitable distribution of healthcare resources, loss of confidentiality and associated stigma, the duty to care for patients diagnosed with COVID-19 and rights of healthcare workers and

issues relating to clinical trials of potential therapies and vaccines. In addition, the preparedness for pandemics and associated issues by the healthcare workers are also highlighted.

Discussion

The COVID-19 pandemic once again has brought to the fore the conflict between the components of public health ethics which has the interest of the community at large and clinical ethics that cater for infected individuals. Public health ethics uses several interventions ranging from vaccination to restriction of movement and forced quarantine to contain diseases.[12] It is based on the philosophy of utilitarianism which aims for the overall good of the society. This incursion into personal freedom by authorities during disasters and public health emergencies has always been a controversial issue worldwide.[13]

The identified ethical challenges are discussed in detail below:

1. Justice and equitable distribution of healthcare resources

The ethical challenge of justice and equitable allocation of resources is perhaps the most glaring during the present pandemic. In Italy, Spain and the United States of America, the discussion about how to triage COVID-19 patients in need of intensive care unit (ICU) care beds and eventually ventilators was prevalent during this outbreak.[14-16] Subsequently, physicians were being forced to “play god” choosing who to put on a ventilator (and eventually survive) and or not (who may die).[17] Even in the presence of national and international guidelines for triaging during pandemics, this practice is associated with psychological and mental stress which may not become obvious until months after the outbreak.[18] In Nigeria, most of the patients diagnosed with COVID-19 present with mild to moderate symptoms and ran a milder course of the illness than what was reported in Europe or the USA.[19] Of course, those with underlying medical conditions also had a more severe course of the disease in Nigeria as witnessed in other climes.[20] This gave the country a “soft landing” as there are limited ICU beds, critical care specialists and even fewer number of ventilators in the country at the onset of the pandemic.[21] This also presented an opportunity for the government to scale up the number of available ICU bed space and ventilators during this “honeymoon” period in case the clinical presentations become more severe.

The COVID-19 pandemic has succeeded in shifting the focus of governments and healthcare practitioners away from the routine day to day health problems of the populace. This is another ethical issue related to just and equitable allocation of resources. Some of the restrictions put in place limited patients' access to healthcare facilities leading to a break in the interactions between them and healthcare providers.[22] Also, the lost daily income as a result of the restriction of movement may lead to their inability to pay for their medicines with the consequence of poor health outcomes and increasing morbidity. The supply chain of pharmaceuticals have also been disrupted leading to drug shortages which may also impact negatively on patients' adherence.[23] Many hospitals have had to cancel elective surgeries, outpatients' clinics and suspend admissions all in a bid to reduce the spread of the infection and also make personnel available to assist in the management of cases.[24] A recent report by the World Health Organization (WHO) predicted a worsening of malaria morbidity and mortality in many low to middle-income countries (LMIC) because of the shift of focus, social and economic impact of COVID-19.[25] There are preliminary reports of similar outcomes for other infectious and non-communicable diseases such as tuberculosis, HIV, diabetes mellitus and systemic hypertension.[26] There is a need for the deployment of the strategies for continuation of care for outpatients and maintenance of critical drug supplies during this critical period to reduce non-COVID-19 related morbidity and mortality. A workable approach is the use of information and communication technology (ICT) especially coordination of patient care through phone calls or messaging or even telemedicine. Patient consultation through telemedicine is a novel development in this clime though has been adopted successfully elsewhere before and during this pandemic.[27, 28] Some healthcare facilities in Nigeria and other LMICs have reported successful use of telemedicine during the COVID-19 pandemic and should be expanded to other healthcare facilities especially those located in semi-urban and rural settings.[29, 30] However, dealing with patients living in the rural areas and the non-IT inclined patients would prove more challenging. Another way of continuing care for patients during this pandemic is the use of community-based consultations and community pharmacies. [31, 32] These are suggestions for stakeholders involved in planning about strategies for dealing with future pandemics.

2. Breach of confidentiality and stigmatization

COVID-19 is a highly contagious infection spread through droplets or contaminated surfaces. The magnitude of mortality recorded in China, Europe and USA created a panic mode at the onset of the pandemic leading to stigmatization of infected individuals with implications for their mental health, security of lives and properties.[33] The issue of COVID-19-associated stigma was not limited to Nigeria, as this was also reported in Europe with many countries closing their borders with neighbours early during the infection, hampering on the principle of European solidarity.[34, 35] We have also heard of some communities in African countries refusing to have testing centres located in their environment because of stigma and potential spread of the disease.[36] We believe that there can be no associated stigma if patient's confidentiality is not breached. The confidentiality of patient's information is one of the core principles of biomedical ethics and the lack of it may negatively impact patient volunteering information and ultimately limit contact tracing for the infection. Other consequences of stigmatization include delay in seeking care, prejudice against populations and incidents of violence against patients who are believed to be infected.[37] The ultimate good of the majority which is the mainstay of utilitarianism often comes into conflict with the principle of confidentiality, but this could be better managed. The transfer of patients who have tested positive for COVID-19 from their homes to isolation centres may need to be modified to lessen the level of attention generated which may negatively impact the patient and relatives long after recovery. Debates are also ongoing in some countries on the need or otherwise to identify COVID-19 positive cases especially in their place of work to facilitate contact tracing.[38] This is very controversial as revealing personal information of infected patients may lead to stigmatization.

3. Duty to care and rights of healthcare workers

The “duty to care” is one of the core professional and moral attributes of physicians and other healthcare workers worldwide as highlighted in the Hippocratic Oath and other professional codes of ethics. The absolutism of this code is being challenged constantly especially with the emergence of new infections and pandemics. The duty to care for patients with HIV and other socially dreaded infectious diseases was specifically highlighted in the Nigerian Code of Medical Ethics (2008 edition).[11] There are also numerous debates whether the healthcare workers are absolutely duty bound to care for COVID-19 patients especially in the absence of personal preventive materials.[39] Must physicians expose themselves and by extension family members to this highly contagious infection while carrying out their duties? Reports from China and Italy have shown that a significant proportion of healthcare workers were infected while providing care for patients during the ongoing pandemic.[40,41] Incidentally, most of these morbidities and mortalities have been linked to inadequate provision of protective materials for frontline healthcare workers during the early phase of the outbreak.[42] The provision of personal protective equipment, enhanced compensatory and life insurance schemes are the core requirements for healthcare workers on the frontline. The frontline cannot be clearly defined in the setting of many LMICs like Nigeria where the capacity for testing is grossly inadequate with potential for contact with asymptomatic infections. There is also a high burden of other infectious diseases with similar presentation to COVID-19; this in the absence of adequate testing may put healthcare workers at various levels of care at risk. Unfortunately, these materials were also in short supply even in some developed countries during the first wave of COVID-19 pandemic and the situation in majority of our facilities is not better.[43] A quote from a paper by Iserson says that “Despite numerous medical ethical codes, nothing-either morally or legally-requires a response to risk-prone situations from civilian clinicians; it remains a personal decision”.[44] Aminu et al in the wake of Ebola virus infections in West Africa a few years ago also emphasized the need for provision of necessary protective equipment and compensation for healthcare workers.[45] The duty of physician to promote his own well-being has also been enshrined in the recent updated physicians' pledge of the World Medical Association.[46] The earlier cited Nigerian Code of Medical Ethics also emphasized the need for provision of adequate personal preventive equipment to enable healthcare workers perform their duties optimally during epidemics.[11] A systematic review and meta-analysis on healthcare workers willingness to work during pandemics identified perceived personal safety as one of the factors associated with increased willingness to work.[47] We agree with this line of argument and concur with the submission that healthcare workers only have a moral duty to treat patients with COVID-19 if the necessary protective equipment and adequate compensation are not provided.

4. Issues related to clinical trials for potential therapies and vaccines

There are now several controversies regarding the efficacy of certain medications in the treatment of COVID-19 infection. The conflicting reports about the efficacy and safety of chloroquine, hydroxychloroquine and ivermectin are still fresh in our memory. [48-50] Several vaccines have been approved and deployed within the last 18 months following clinical trials in many countries. As of March 20, 2022, 6434 clinical trials on COVID-19 are listed on the WHO database.[51] Most of these clinical trials are being fast-tracked especially during the pre-vaccine era because of lack of effective therapies and alarming level of mortality among COVID-19 patients. This act however portends some dangers as the clinical trials may lack adequate scientific vigour; with the possibility of approvals of medicines with poor efficacy and questionable long-term safety profile.[52] We are beginning to see reports of several adverse effects not initially observed during the clinical trials fueling the fire of vaccine hesitancy among the populace.[53-55] The issue of equity regarding access to COVID-19 vaccine especially to citizens of LMICs like Nigeria is a major challenge that came to the fore with the approval and roll-out of the COVID-19 vaccines.[56] This is highlighted by the disparity in vaccination rates between countries in Europe, North America and the LMICs illuminating the so-called “vaccine nationalism”.[57] This is despite the efforts of the WHO, non-governmental organizations and other developmental partners towards vaccine equity through the vaccine sharing interventions such as COVAX scheme and donations from several countries.[58] There is an urgent need therefore for investment in local development and production of COVID-19 vaccines and therapies to improve access.

5. Vaccine mandates and hesitancy

The debate on compulsory vaccination for citizens and especially for healthcare workers continues to polarise many communities. [59, 60] The main issue at stake here is the conflict between autonomy of the citizen and the overall health of the community. In many countries, arguments in support of mandatory vaccinations for protection of public health and safety of citizens has the upper hand. Vaccine hesitancy by the healthcare workers and their rights and responsibilities to patients and the public is another very topical issue. [61, 62] Are fully vaccinated healthcare workers also obligated to attend to patients that are not vaccinated? Some would argue that physicians should continue to fulfil their obligations to patients irrespective of their vaccination status; the debate is still on.

6. Ethics of pandemic preparedness

The global impact of COVID-19 pandemic on all spheres of life (healthcare, economy, personal freedom etc) has brought to the fore the need for countries to be in a state of preparedness for future pandemics. The unprecedented level of morbidity and mortality experience during this pandemic was largely due to poor preparedness of many countries. In Nigeria and some West African countries, recent experiences with Ebola virus disease had laid the foundation for a somewhat robust preparedness on which current activities and interventions were based.[63] Despite this, gaps identified in pandemic preparedness include: capacity building in the field of genomics/bioinformatics, improved relationships (including data sharing) between countries and regions, strengthening of health systems and infrastructure.[64, 65] Other interventions to improve on pandemic preparedness include promotion of public-private partnerships in healthcare especially in diagnostics, provision of PPE and infrastructure for health.[66]

Conclusion and Recommendations

The ethical principles of equitable distribution of healthcare resources, confidentiality and issues relating to duty to care by healthcare workers are the most relevant in this study.

The global impact of the COVID-19 pandemic has opened the debate on the need for an internationally acceptable policy framework on ethics relating to epidemics/pandemics. This may be a part of a bigger task force on preparedness for these infections as well as future pandemics with the sole aim of setting up guidelines to address identified ethical issues and others that may arise from time to time.

References

1. Cheng SC, Chang YC, Fan Chiang YL, Chien YC, Cheng M, Yang CH, Huang CH, Hsu YN. First case of Coronavirus Disease 2019 (COVID-19) pneumonia in Taiwan. *J Formos Med Assoc* 2020, 119:747-751.
2. Hui DS, E IA, Madani TA, Ntoumi F, Kock R, Dar O, Ippolito G, McHugh TD, Memish ZA, Drosten C, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - The latest 2019 novel coronavirus outbreak in Wuhan, China. *Int J Infect Dis* 2020, 91:264-266.
3. Jee Y. WHO International Health Regulations Emergency Committee for the COVID-19 outbreak. *Epidemiol Health* 2020, 42:e2020013.
4. Oleribe O, Olawepo O, Ezechi O, Osita-Oleribe P, Fertleman M, Taylor-Robinson SD. Describing the Epidemiology of COVID-19 in Nigeria: An Analysis of the First Year of the Pandemic. *J Health Care Poor Underserved* 2022, 33:33-46.
5. Nigerian Centre for Disease Control. NCDC Coronavirus COVID-19 Microsite. [<https://covid19.ncdc.gov.ng>]. Accessed on March 30, 2022.
6. Christian MD. Triage. *Crit Care Clin* 2019, 35:575-589.
7. Jaziri R, Alnahdi S. Choosing which COVID-19 patient to save? The ethical triage and rationing dilemma. *Ethics Med Public Health* 2020, 15:100570.
8. Annas GJ, Mariner WK: (Public) Health and Human Rights in Practice. *J Health Polit Policy Law* 2016, 41:129-139.
9. Soled D. Public health nudges: weighing individual liberty and population health benefits. *J Med Ethics* 2021, 47:756-760.
10. Simonds AK, Sokol DK. Lives on the line? Ethics and practicalities of duty of care in pandemics and disasters. *Eur Respir J* 2009, 34:303-309.
11. Medical and Dental Council of Nigeria: Codes of Medical Ethics in Nigeria. Available at <http://www.mdcnigeria.org/Downloads/CODE%20OF%20CONDUCTS.pdf>. Accessed on April 23, 2020
12. Childress JF, Faden RR, Gaare RD, Gostin LO, Kahn J, Bonnie RJ, Kass NE, Mastroianni AC, Moreno JD, Nieburg P. Public health ethics: mapping the terrain. *J Law Med Ethics* 2002, 30:170-178.
13. Nixon S, Forman L. Exploring synergies between human rights and public health ethics: A whole greater than the sum of its parts. *BMC Int Health Hum Rights* 2008, 8:2.
14. Nicoli F, Gasparetto A. Italy in a Time of Emergency and Scarce Resources: The Need for Embedding Ethical Reflection in Social and Clinical Settings. *J Clin Ethics* 2020, 31:92-94.
15. Solnica A, Barski L, Jotkowitz A. Allocation of scarce resources during the COVID-19 pandemic: a Jewish ethical perspective. *J Med Ethics* 2020, 46:444-446.
16. Antommaria AHM, Gibb TS, McGuire AL, Wolpe PR, Wynia MK, Applewhite MK, Caplan A, Diekema DS, Hester DM, Lehmann LS, et al. Ventilator Triage Policies During the COVID-19 Pandemic at U.S. Hospitals Associated With Members of the Association of Bioethics Program Directors. *Ann Intern Med* 2020, 173:188-194.
17. Mannelli C. Whose life to save? Scarce resources allocation in the COVID-19 outbreak. *J Med Ethics* 2020, 46:364-366.
18. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, Wu J, Du H, Chen T, Li R, et al. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Netw Open* 2020, 3:e203976.
19. Onyegbutulem HC, Dogo D, Nnabuchi CV, Aghahowa ME, Alu FE, Afimah EU, Atanda OD, Nwankwo CG, Ani-Osheku I, Olatise OO, et al. Epidemiologic Characteristics, Clinical Features and Outcomes of COVID 19: Patients Admitted at the Asokoro District Hospital Isolation and Treatment Center, Abuja, North Central Nigeria. *West Afr J Med* 2021, 38:1120-1128.
20. Adejumo AO, Ogunniyan TB, Oladokun OD, Oluwadun OB, Adesola S, Mutiu WB, Abdus-Salam IA, Saka BA, Adetola AV, Ogunsanya AO, et al. Length of Hospital Stay of COVID-19 Patients managed at the Lagos State Isolation Centres during the First Wave of the Pandemic. *West Afr J Med* 2022, 39:269-274.
21. Ogoina D, Mahmood D, Oyeyemi AS, Okoye OC, Kwaghe V, Habib Z, Unigwe U, Iroezindu MO, Garbati MA, Rotifa S, et al. A national survey of hospital readiness during the COVID-19 pandemic in Nigeria. *PLoS One* 2021, 16:e0257567.
22. Vente T. A year without touch: a reflection on physician-patient interaction during COVID-19. *Pediatr Res* 2021, 90:1115-1116.

23. Menon S, Sander JW. Effects of the COVID-19 pandemic on medication adherence: In the case of antiseizure medications, A scoping review. *Seizure* 2021, 93:81-87.
24. Bigoni A, Malik AM, Tasca R, Carrera MBM, Schiesari LMC, Gambardella DD, Massuda A. Brazil's health system functionality amidst of the COVID-19 pandemic: An analysis of resilience. *Lancet Reg Health Am* 2022, 10:100222.
25. Aborode AT, David KB, Uwishema O, Nathaniel AL, Imisioluwa JO, Onigbinde SB, Farooq F. Fighting COVID-19 at the Expense of Malaria in Africa: The Consequences and Policy Options. *Am J Trop Med Hyg* 2021, 104:26-29.
26. Chanda-Kapata P, Ntoumi F, Kapata N, Lungu P, Mucheleng'anga LA, Chakaya J, Tembo J, Himwaze C, Ansumana R, Asogun D, et al. Tuberculosis, HIV/AIDS and Malaria Health Services in sub-Saharan Africa - A Situation Analysis of the Disruptions and Impact of the COVID-19 Pandemic. *Int J Infect Dis* 2022.
27. Kursīte M, Stars I, Strēle I, Gobiņa I, Ķīvīte-Urtāne A, Behmane D, Dūdele A, Villeruša A. A mixed-method study on the provision of remote consultations for non-communicable disease patients during the first wave of the COVID-19 pandemic in Latvia: lessons for the future. *BMC Health Serv Res* 2022, 22:263.
28. Scott SN, Fontana FY, Helleputte S, Pickles J, Laimer M, Zueger T, Stettler C. Use and Perception of Telemedicine in People with Type 1 Diabetes During the COVID-19 Pandemic: A 1 Year Follow-Up. *Diabetes Technol Ther* 2022.
29. Balogun M, Banke-Thomas A, Gwacham-Anisiobi U, Yesufu V, Ubani O, Afolabi BB. Actions and Adaptations Implemented for Maternal, Newborn and Child Health Service Provision During the Early Phase of the COVID-19 Pandemic in Lagos, Nigeria: Qualitative Study of Health Facility Leaders. *Ann Glob Health* 2022, 88:13.
30. Ilori T, Salam TO, Olalemi OE. Influence Of Covid-19 Pandemic on Medical Consultations In Outpatients Clinics, Southwestern Nigeria - A Commentary. *Ann Ib Postgrad Med* 2021, 19:87-89.
31. Appelman IF, Thompson SM, van den Berg LMM, van der Wal JTG, de Jonge A, Hollander MH. It was tough, but necessary. Organizational changes in a community-based maternity care system during the first wave of the COVID-19 pandemic: A qualitative analysis in the Netherlands. *PLoS One* 2022, 17:e0264311.
32. Karout S, Khojah HMJ, Itani R, Jaffal F, El-Lakany A. Assessing the pharmaceutical care provision to suspected COVID-19 patients in community pharmacies: a simulated patient study. *BMC Health Serv Res* 2022, 22:467.
33. Warren AM, Khetan R, Bennett M, Pogue J, Waddimba AC, Powers MB, Sanchez K. The relationship between stigma and mental health in a population of individuals with COVID-19. *Rehabil Psychol* 2022.
34. Babatunde OA, Owoicho SA, Sunday ST, Akande A, Yesufu BM, Akanbi IM, Dairo MD. An Assessment of Perceived Stigmatization of Patients Infected with COVID-19 in the Nation's Epicenter of the Pandemic: A Cross-Sectional Study of Residents of Agege, Lagos, Nigeria. *West Afr J Med* 2021, 38:1206-1215.
35. Burns J, Movsisyan A, Stratil JM, Biallas RL, Coenen M, Emmert-Fees KM, Geffert K, Hoffmann S, Horstick O, Laxy M, et al. International travel-related control measures to contain the COVID-19 pandemic: a rapid review. *Cochrane Database Syst Rev* 2021, 3: Cd013717.
36. Coronavirus. Ivory Coast protesters target testing centre [<https://www.bbc.com/news/world-africa-52189144>]
37. Beck EJ, Gill W, De Lay PR. Protecting the confidentiality and security of personal health information in low-and middle-income countries in the era of SDGs and Big Data. *Glob Health Action* 2016, 9:32089.
38. Sulmasy DP, Veatch RM. Should Institutions Disclose the Names of Employees with Covid-19? *Hastings Cent Rep* 2020, 50:25-27.
39. Millar M, Hsu DTS. Can Healthcare Workers Reasonably Question the Duty to Care Whilst Healthcare Institutions Take a Reactive (Rather than Proactive) Approach to Infectious Disease Risks? *Public Health Ethics* 2019, 12:94-98.
40. Kursumovic E, Lennane S, Cook TM. Deaths in healthcare workers due to COVID-19: the need for robust data and analysis. *Anaesthesia* 2020, 75:989-992.

41. Manzoni P, Milillo C. Covid-19 mortality in Italian doctors. *J Infect.* 2020, 81:e106-e107.
42. Mandrola J. COVID-19 and PPE: some of us will die because of the shortage. *Recenti Prog Med* 2020, 111:183.
43. Rowan NJ, Laffey JG. Challenges and solutions for addressing critical shortage of supply chain for personal and protective equipment (PPE) arising from Coronavirus disease (COVID19) pandemic - Case study from the Republic of Ireland. *Sci Total Environ* 2020, 725:138532.
44. Iserson KV. Must I Respond if My Health is at Risk? *J Emerg Med* 2018, 55:288-293.
45. Yakubu A, Folayan MO, Sani-Gwarzo N, Nguku P, Peterson K, Brown B. The Ebola outbreak in Western Africa: ethical obligations for care. *J Med Ethics* 2016, 42:209-210.
46. World Medical Association Statement on Physician Well-Being. Available at [<https://www.wma.net/policies-post/wma-statement-on-physicians-well-being>]. Accessed December 2020
47. Aoyagi Y, Beck CR, Dingwall R, Nguyen-Van-Tam JS. Healthcare workers' willingness to work during an influenza pandemic: a systematic review and meta-analysis. *Influenza Other Respir Viruses* 2015, 9:120-130.
48. Kotecha P, Light A, Checcucci E, Amparore D, Fiori C, Porpiglia F, Dasgupta P, Elhage O. Repurposing of drugs for COVID-19: a systematic review and meta-analysis. *Panminerva Med* 2022, 64:96-114.
49. Bansal P, Goyal A, Cusick At, Lahan S, Dhaliwal HS, Bhyan P, Bhattad PB, Aslam F, Ranka S, Dalia T, et al. Hydroxychloroquine: a comprehensive review and its controversial role in coronavirus disease 2019. *Ann Med* 2021, 53:117-134.
50. Hill A, Mirchandani M, Pilkington V. Ivermectin for COVID-19: Addressing Potential Bias and Medical Fraud. *Open Forum Infect Dis* 2022, 9:ofab645.
51. COVID-19 Studies from the World Health Organization Database. Available at [https://clinicaltrials.gov/ct2/who_table]. Accessed March 30, 2022
52. Won J-H, Lee H. The current status of drug repositioning and vaccine developments for the COVID-19 pandemic. *Int J Mol Sci.* 2020, 21:9775.
53. Block JP, Boehmer TK, Forrest CB, Carton TW, Lee GM, Ajani UA, Christakis DA, Cowell LG, Draper C, Ghildayal N, et al. Cardiac Complications After SARS-CoV-2 Infection and mRNA COVID-19 Vaccination - PCORnet, United States, January 2021-January 2022. *MMWR Morb Mortal Wkly Rep* 2022, 71:517-523.
54. Khajavirad N, Salehi M, Haji Ghadery A, Khalili H, Arab Ahmadi M, Dehghan Manshadi SA, Zare Dehnavi A. Serious events following COVID-19 vaccination with ChAdOx1 nCoV-19 vaccine (Vaxzevria): A short case series from Iran. *Clin Case Rep* 2022, 10:e05390.
55. Garg RK, Paliwal VK. Spectrum of neurological complications following COVID-19 vaccination. *Neurol Sci* 2022, 43:3-40.
56. Hunter DJ, Abdool Karim SS, Baden LR, Farrar JJ, Hamel MB, Longo DL, Morrissey S, Rubin EJ. Addressing Vaccine Inequity - Covid-19 Vaccines as a Global Public Good. *N Engl J Med* 2022, 386:1176-1179.
57. Lawal L, Aminu Bello M, Murwira T, Avoka C, Yusuf Ma'aruf S, Harrison Omonhinmin I, Maluleke P, Tsagkaris C, Onyeaka H. Low coverage of COVID-19 vaccines in Africa: current evidence and the way forward. *Hum Vaccin Immunother* 2022:1-5.
58. de Bengy Puyvallée A, Storeng KT. COVAX, vaccine donations and the politics of global vaccine inequity. *Global Health* 2022, 18:26.
59. Hagan K, Forman R, Mossialos E, Ndebele P, Hyder AA, Nasir K. COVID-19 vaccine mandate for healthcare workers in the United States: a social justice policy. *Expert Rev Vaccines* 2022, 21:37-45.
60. Druml C, Czech H. A pandemic is no private matter: the COVID-19 vaccine mandate in Austria. *Lancet Respir Med* 2022, 10:322-324.
61. Savic LC, Savic S, Pearse RM. Mandatory vaccination of National Health Service staff against COVID-19: more harm than good? *Br J Anaesth* 2022, 128:608-609.
62. Biswas N, Mustapha T, Khubchandani J, Price JH. The Nature and Extent of COVID-19 Vaccination Hesitancy in Healthcare Workers. *J Community Health* 2021, 46:1244-1251.
63. Afolabi MO, Folayan MO, Munung NS, Yakubu A, Ndow G, Jegede A, Ambe J, Kombe F. Lessons from the Ebola epidemics and their applications for COVID-19 pandemic response in sub-Saharan Africa. *Dev World Bioeth* 2021, 21:25-30.

64. Elebesunu EE, Oke GI, Adebisi YA, Nsofor IM. COVID-19 calls for health systems strengthening in Africa: A case of Nigeria. *Int J Health Plann Manage* 2021, 36:2035-2043.
65. Tessema GA, Kinfu Y, Dachew BA, Tesema AG, Assefa Y, Alene KA, Aregay AF, Ayalew MB, Bezabhe WM, Bali AG, et al. The COVID-19 pandemic and healthcare systems in Africa: a scoping review of preparedness, impact and response. *BMJ Glob Health* 2021, 6.
66. Binder S, Ario AR, Hien H, Mayet N, Jani IV, Ihekweazu C, Abate E, Nsanzimana S, Yavo W, Halatoko WA, et al. African National Public Health Institutes Responses to COVID-19: Innovations, Systems Changes, and Challenges. *Health Secur* 2021, 19:498-507.