Medical Science

Review

Telehealth during COVID-19: why Sub-Saharan Africa is yet to log-in to virtual healthcare?

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Abstract: Telehealth is the use of technology to achieve remote care. This technology can be synchronous or asynchronous. The use of Telehealth increased during the pandemic in the developed countries. On the contrary, telehealth is not fully utilized in public healthcare in many Sub-Saharan African states. This editorial explores the benefits of the adoption of virtual care in public healthcare during COVID-19 pandemic. Benefits of telehealth include efficient stretching of healthcare resources, forward triaging, prevention of medical personnel infection, aiding medical students' clinical observation and participation, and assurance of social support for patients. The absence of policy and political will, inadequate funding, cost of sustenance of telehealth services, patient and healthcare personnel bias on telehealth, willingness to pay and the peculiar challenges in each country are identified limiting factors to the use of Telehealth in Sub-Saharan Africa. We affirm that the foundation to full implementation of Telehealth services in Sub-Saharan African states lies within government political will. Further, the creation of policy framework for telehealth, removal of telecommunication company monopoly, utilization of cloud-based processing telehealth systems, development of telehealth software with broadband efficiency that fits Sub-Saharan clime, the introduction of telehealth training into medical school curriculums, and research and development of user-interface that fits the peculiarities of Sub-Saharan Africa are the solutions we propose to change the current narrative of virtual care in Sub-Saharan Africa.

Keywords: telehealth; virtual healthcare; COVID-19; pandemic; Sub-Saharan Africa

1. Background

Telehealth is the use of technology for remote healthcare [1]. This is as simple as a radio which was used in the past to give medical advice to soldiers at the war front, or advanced like the contemporary video conferencing devices of today. Telehealth technology is in use in different ways to provide healthcare to patients; these ways include remote patient monitoring (the information is gathered via an internet-enabled wearable, mobile device, or smartphone applications), their use in the store and forward process (the capture, storage, and transmission of patient health information for asynchronous healthcare delivery using data storage and transmission technology), and their use in real-time, synchronous interaction between patient and medical personnel [2].

The novel Coronavirus Disease-19 (COVID-19) pandemic lockdown necessitates the use of digital technology to achieve virtual health care to circumvent the challenges of in-person care. The virtual healthcare approach is indeed in-use and feasible in many countries that have advanced and sophisticated health care systems such as in the United States and the National Health Service in the United Kingdom; this is quite different from the narrative before COVID-19 lockdown.

The ostensible benefit of virtual healthcare is to significantly reduce the proportion of in-person care, physically attending only to people who, for some reasons, cannot use the telehealth technology and those patients with the need for physical examination. Further, there are a lot of covert benefits of telehealthcare that includes preventing personal protective equipment (PPE) shortage through virtual rounds, reducing nosocomial infection due to reduction of unnecessary clinic visitation especially in COVID-19 management units, protecting medical personnel from COVID-19 infection, and re-establishing undergraduate medical students clinical observership and medical care participation that has been halted due to the pandemic as shown in the Figure 1. Adoption of telehealth technology by public healthcare systems has offered immense vantage that conditions around a pandemic such as COVID-19 have spotlighted.

In contrast, Sub-Saharan Africa (SSA) lags in incorporating telehealth in healthcare management since pre-COVID-19 due to many challenges that are still prevailing amidst the COVID-19 pandemic [3]. Implementation of telehealth in Sub-Saharan Africa as observed by the authors and from current works of literature is largely poor; we are yet to log in.

However, there are seed implementations of telehealth applications across the region. Most of the telehealth programs are pilot projects sponsored by foreign aids or private investment, or public-private partnership; they are not concrete and also unsustainable. Such pilot projects are the Abiye Project in Ondo State, Nigeria and the RESCUER project in Uganda—both cater for maternal care and antenatal care [4]. We must also mention the use of telehealth provided by private establishments; also companies that provide virtual healthcare service to their employees, particularly those employees that work in places far away from the company's headquarters. An example of this is the use of telehealth by Shell, a multinational oil and gas company, to provide healthcare to their workers in remote regions of Nigeria [5]. Pilot projects for public service are with their human-centered challenges, some of which will be discussed later in the editorial. The telehealth services by private establishments cannot go around, thereby contributing to health inequality.

Barriers to telehealth in Sub-Saharan Africa during the pandemic are closely linked to existing challenges hindering telehealth in the health sector before the pandemic; the challenges include lack of policies and political support for telemedicine implementation [3], high cost of adoption of telemedicine that uses live-video communication; this is related to unavailability of high-speed internet

access in some rural Sub-Saharan African towns, although over 650 million of Africans are users of mobile phone devices [6]. Subscription to health insurance in Sub-Saharan Africa is low [7], hence the problem of payment for telehealth service. On the part of healthcare personnel, the challenges include lack of training on the use of telemedicine platforms in healthcare vis-à-vis the inadequate utilization of Information Communication Technology (ICT) in critical aspects of healthcare like health information management, the concern of breach of code of medical ethics [3], the fear of breaching patient privacy on use of digital channels in health service delivery, and inability to palpitate for a thorough examination [8].
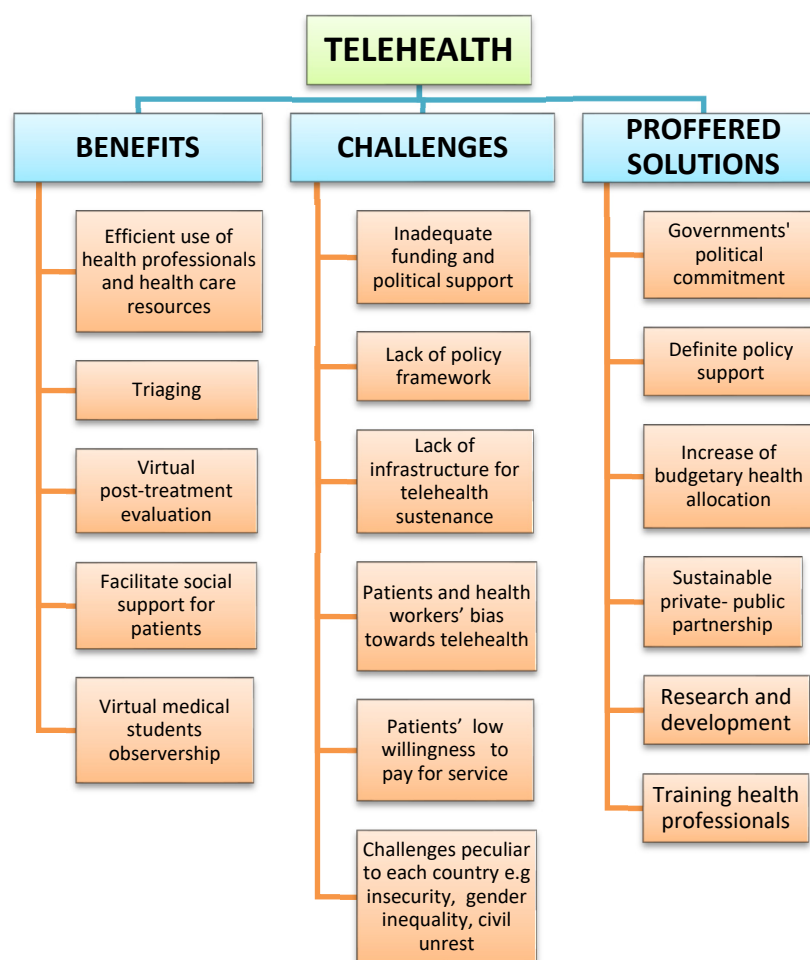
Figure 1. Benefits, challenges, and solutions for telehealth in Sub-Saharan Africa.

These limitations as well as possible solutions will be discussed as we go on in this editorial. We will extensively answer the following questions: (1) what are the benefits of adopting telehealth now and in the post-COVID-19 era by public healthcare institution, particularly in Sub-Saharan Africa (2) what are the possible challenges and limitations to this development in Sub-Saharan Africa (3) what are the possible solutions to the discussed challenges.

2. What do public healthcare systems in Sub-Saharan Africa have to gain from adopting telehealth?

The COVID-19 pandemic has prompted the use of virtual care technology that makes direct hospital consultation unnecessary at a rate that is more than before the pandemic [9]. From the COVID-19 frontline to non-COVID-19 consultation in both in-patient clinic and out-patient clinic, the use of virtual care technology has shown a lot of benefits from the caregiver's perspective as well as the patient's perspective [9].

Across all COVID-19 frontlines, there is a rising number of medical personnel being infected, and even some succumbing to the virus. Some nations are faced with friction in the allocation of resources such as PPE, N95 mask, and surgical mask. This could be a result of an inadequate supply of protection resources due to underfunding and the overwhelming number of cases. All these conditions and other reasons could put medical personnel in a vulnerable position. A typical operational setup to circumvent this challenge is described as follows: a monitor or tablet with an internet-connected camera fixated resourcefully to a regular drip stand or trolley that can ensure mobility in a particular ward and transition between wards. Assuredly, other types of equipment in the frontiers of medical equipment such as digital telescopes could be added to the basics. The use of telehealth for virtual healthcare reduces in-room visits, the use of limited PPE and limits unnecessary in-person consultation [10]. The prudent use of resources and personnel allocation is assured.

Telehealth aids post-treatment monitoring of convalescing COVID-19 patients. Critical to the COVID-19 containment effort is the assurance that there is thorough recovery even after the patient has been discharged. This is possible through virtual check-ups. Discharged COVID-19 patients can be monitored intermittently to watch out for possible relapse of the infection without making contact with healthcare personnel. The patient can be recalled back to treatment in case of relapse as soon as possible.

Under the same theme is the forward triage, assessment of primary progression, and assessing treatment urgency. The SARS-CoV-2 infection shares symptoms with other flu-like sicknesses. Many at this time could confuse flu with COVID-19 thus making the call for testing and medical care that could jeopardize the stretching of human and technical resources and prudent use of test resources, especially in under-stocked regions. Many health care systems for COVID-19 containment have rolled out platforms that range from triaging website, software, and applications (mobile and desktop alike) to do end of self-testing and triaging to assess the true necessity for a real test and urgency of treatment [11]. Furthermore, this works well for assessing the urgency of a non-COVID-19-related out-patient clinic visit.

The feasibility of the use of virtual healthcare is evident in the uptrend use in the public health care system in some developed countries. For instance, in the Duke University School of Medicine, during the stay-at-home order that commenced in March 2020 in the United States, healthcare officers saw more than 600 patients per day via synchronous video call, with many in-person clinic visitations replaced with video or telephone visits; and the share of telehealth visits increased within 4 weeks from less than 1% of total visits to 70% of total visits, reaching more than 1000 video visits per day [12]. This is a harbinger that overwhelming hospital visits have found a solution, particularly in Sub-Saharan African countries with long-standing poor doctor-to-patient ratio.

COVID-19 patients on management in medical facilities such as isolation centers are at the vulnerable state of their existence. They need social support. COVID-19 patients in isolation centers

are characterized by uncertainties, loss of hope, despair, sleep deprivation, loneliness, depression, and ultimately a cut-off from social contact and support from friends and family [13][14]. In fact, in a recent research article on the quality of COVID-19 treatment globally from the patients' opinion by researchers from Ibadan Nigeria, it was reported that a COVID-19 survivor claimed "I was scared I might die alone" [15]. Therefore, video conferencing of such a setup described previously avails COVID-19 patients virtual contact with social support groups, and a sense of emotional connection through a regular audio-visual, synchronous contact with their family, friends, and emotional support staffs.

Medical schools in regions affected by the COVID-19 pandemic had to withdraw their clinical students from clinical observership as soon as the number of cases became uncontrollable. Among several reasons for the halt of medical education include high transmissibility of the virus, the need to prevent COVID-19 cases among medical students, and the need to keep medical students with no full clinical skill off the COVID-19 frontline. With telehealth operational setup, medical students can have virtual presence in every ward rotation despite the odds against them. In addition to the basic operational setup, a remote teleconferencing studio could be added within the perimeter of the medical institution where medical students can meet treatment team for virtual clinical observation, clerking, case presentation, and virtual bedside teaching; all of these necessitate the incorporation of "web side" manners into medical education curriculum at both undergraduate and residency level in Sub-Saharan Africa's medical schools.

Sub-Saharan Africa, a high burden region for Tuberculosis, Human Immunodeficiency Virus (HIV), and Malaria, cannot afford to lessen efforts in reducing/eradicating other infectious diseases in the region; even in the face of the COVID-19 pandemic [16]. This underscores the need for prudent allocation of expertise resources in an already understaffed health system. Telehealth affords African states efficient utilization of expertise of health care practitioners (nationally and internationally) in timeous diagnoses, triaging, and treatment of not only COVID-19 but also other infectious diseases patients [17]. It further strengthens healthcare accessibility in rural regions of African states as expertise becomes accessible to hitherto underserved areas.

3. Limitations to the use of Telehealth Care during COVID-19 in Sub-Saharan Africa and the proffered solutions

3.1. Inadequate funding, policies, and political support

Poor funding for healthcare is a recurrent problem in Sub-Saharan Africa, with many public healthcare facilities depending on government funding [3,18]. Besides, there is little or no legal framework for telehealth in most Sub-Saharan African states [19]. On one hand, this suggests indifference on the part of governments toward telehealth; and on the other hand, it weakens the confidence of private investors interested in telehealth since telehealth operations can be divergent to existing traditional healthcare service [18].

A major factor preventing the implementation of telehealth in SSA, especially in the rural regions, is the high cost of infrastructure. A cost-effectiveness analysis carried out in the Amansie-West district, Ghana, a region with an estimated population of 149,437 based on the 2010 census, shows that when compared to the cost of building a conventional primary health center, the implementation of a telehealth based clinic was 4.3% more expensive [20]. The analysis also shows that the facilities

required for the implementation of telehealth in a place of that population size cost about $700,000 [20]. When considered in terms of scale for the whole region, telehealth seems impossible since the average allocation of the revenue on healthcare in Africa is less than 6% on average and continues to decline [21].

The governments of SSA states must show the political will to incorporate telehealth into the public healthcare system. This is the prime step towards telehealth implementation in Sub-Saharan Africa. Having extensively discussed the immense advantages of telehealth, and considering the availability of many academic works of literature on the benefits of telehealth pre-COVID-19 and during COVID-19 in several medical specialties, governments have more than enough information to influence a cogent decision on telehealth. The willingness of the government is the foundation that will precede the entrenchment of telehealth in Sub-Saharan Africa; this will drive the increase in health allocation, private individual and government partnership, research for development, and localization of the framework for policy and regulation.

There is a growing number of private telehealth services especially in the mobile application space, that offer online consultation with no regulation by healthcare ministries. A framework can be created using the private providers' as model. A policy document can also be developed from established telehealth regulations and policy documents such as those obtainable in the United Kingdom and the United States. Existing private telehealth service providers and consumers can be used as subjects for a study to understand the perception of consumers, limitations, and opportunities to scale up telehealth services in Sub-Saharan Africa.

Sustainable, long-term financing for telehealth in Sub-Saharan Africa is essential for its successful implementation. To reduce the initial high cost of telehealth implementation, a percentage of the national health budgets of member states should be allocated to funding telehealth implementation. Health facilities and regulators should collaborate with international and local non-governmental organizations, philanthropic organizations, and in-country private sectors to provide and install telehealth technology nationwide beginning with tertiary hospitals [22]. Most foreign aids are geared towards short-term intervention, pilot projects giving rise to proliferation of pilot projects in SSA; hence in-country funding is needed to support a working telemedicine infrastructure in the long run. Furthermore, health financing models like mobile health insurance payable through a recharge voucher system (operated by most telecommunication companies in Sub-Saharan Africa) can be adopted as means of payment for telehealth service.

3.2. Sustenance of telehealth services

The high cost of sustenance and the poor maintenance of facilities challenge telehealth in Sub-Saharan Africa. The combination of inadequate and unstable power supply and high cost of using an alternative source of power, high cost of internet data subscription, and lack of high-speed internet access across many towns are factors that pose a limit to the steady use of telehealth in Sub-Saharan Africa [23].

Sub-Saharan Africa countries are largely foreign technology-dependent, particularly in the health care sector. In addition, there is no arrangement for tailoring the healthcare equipment to fit the SSA clime and expertise of local biomedical technologists. In addition to these mentioned challenges, poor maintenance culture, thick wall of hospital building which can hinder broadband penetration are limitations to the use of telehealth technology designed for developed countries where the narrative is the exact opposite. Collaboration among states is needed to fund research on telehealth care product

design that would fit the region's peculiarities. In this respect, we recommend the following features to meet SSA peculiarities: (1) the use of cloud-based smart software, since they are cheaper and easily maintained than hardware types; their operation, processing, and maintenance are easily done on cloud servers, (2) consideration of new frontiers in smart devices that consume less data and devices that work well with 3G broadband which have considerably more penetration than the 4G broadband in Africa. Furthermore, the monopoly of data service providers should be removed. This will foster competition, hence better service delivery and pocket-friendly internet data package. Also, removal of monopoly for data service providers will attract other providers that will see the provision of the affordable internet data package for telehealth as a niche.

3.3. Perception bias on telehealth

Utilization of telehealth in public healthcare systems in Sub-Saharan Africa states is further weakened by unwilling manpower in the healthcare sector; existing healthcare workers perceive the introduction of telehealth as a double duty that requires incentive or additional pay [19].

Furthermore, there is the notion among clinicians that obtaining complete medical knowledge and examination of the patient before diagnosing or prescribing treatment to avoid medical error is important [19]. Fear of medico-legal or ethical frictions arising from medical errors, privacy issues especially with illiterate or aged patients that must be guided through the consultation process, and the inability to take sensitive examinations of certain parts of a patient, are factors that fuel the continued poor perception of telehealth among health care officers and threaten the adoption of telehealth in Sub-Saharan Africa [8,24].

Incorporation of telehealth usage in the medical education curriculum in Sub-Saharan Africa is a step to train clinicians who are familiar with telehealth and will readily use it not as a dual responsibility, but as a catalyst to effective healthcare delivery. Meanwhile, training and periodic re-training in telehealth usage should equally be inculcated in clinicians' continuing medical education programs. Also, the implementation of incentives and remuneration for the usage of telehealth among clinicians will strengthen the adoption of telehealth [19]. Scheduling visits of allied health workers or nurses to take anthropomorphic data and basic clinical examination, especially for aged and illiterate patients, will reduce privacy and medico-ethics concerns [8]. Harmonization of patient's health records in cloud servers transferable among healthcare facilities will enhance telehealth usage.

3.4. Patients' perception of telehealth and willingness to pay

Citizen's indifference to telehealth, backed by the belief that effective treatment is achieved when one must have physically seen a physician, is another hindrance to telehealth in SSA [25]. Unless telehealth is being subsidized, payment of the access fee for telehealth services might not be commensurate to payment for conventional healthcare services. Health insurance subscription across Sub-Saharan Africa is grossly inadequate and patient willingness to pay to access telehealth services is generally low [26,27].

Research and development of a local user-friendly interface for doctors and patients should be undertaken to endear telehealth usage to Sub-Saharan Africans. Also, a wide cross-sectional study on the perceptions, limitations, and challenges faced by telehealth consumers in Sub-Saharan Africa would present a lucid understanding of the conditions of consumers, and opportunities to develop novel

solutions to produce an increase in acceptance of telehealth by more healthcare users. Furthermore, health financing models like mobile health insurance payable through recharge voucher can be adopted as means of payment for telehealth service.

3.5. Challenges peculiar to individual countries

As Sub-Saharan Africa is wide geographical area, occupied by incredibly diverse people, the sustainable and far-reaching implementation of telehealth will suffer different impediments peculiar to each country. For instance, based on the evaluation report of some telehealth projects in SSA, challenges faced by the projects include gender inequality, low mobile communication devices penetration, and so on. For instance, the implementation of mobile-healthcare to aid ante-natal care of rural and village pregnant women of Burkina Faso faced major gender disparity where husbands make major decisions, financial and others, such as phone ownership, phone call, and message reception; thus telehealth service may not get to the intended target [28]. The challenges that result from gender inequality may not apply to other SSA countries with a positive gender equality index. For example, the shortage of health workers in Nigeria (a result of medical brain-drain) obvious in a mobile maternal healthcare project in Ondo State named Abiye may not apply to other countries such as South Africa [4]. Some countries in SSA (such as Kenya) do not have a functional healthcare system for rural dwellers to build telehealth on. In some cases, the combination of two or more problems affect a particular country. Also, there are issues of insecurity, insurgency, political unrest and civil unrest in certain parts of the region. While collaboration among member countries is expedient, a stand-alone approach around individuality of each country is also important.

4. Conclusion

Telehealth has a lot to offer the existing health care system in Sub-Saharan Africa. From inception, in a form that was fairly suitable to serve in the war, to this period when it serves both patients and health care providers better, telehealth has experienced remarkable development fit for use in a pandemic period such as COVID-19. While virtual care increased in developed regions, Sub-Saharan Africa is yet to fully implement telehealth in public health care. The limitations to the implementation of telehealth in Sub-Saharan Africa are fairly complex, involving tangible ones such as lack of funding, low internet penetration, and abstract problems such as the way both health care personnel and patients perceive telehealth. These challenges are not without possible solutions. The solutions be it policy creation, adequate funding, creation of awareness and training, require the cooperation of all stakeholders involved and strong political will. Changing the current situation of telehealth in Sub-Saharan Africa is possible.

Conflict of interest

All authors declare no conflict of interest in this paper.

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