

Perception and attitude of medical doctors toward the use of Information and communication technologies (ICT's) in the management of HIV/AIDS in Nigeria

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Abstract

Around the world, many people including medical doctors perceive and have different attitudes toward the use of information and communication technologies (ICT). The term ICT embraces information communication tools or devices used in the dissemination of information within the ambiance of HIV/AIDS management. This study seeks to establish the perceptions and attitudes of medical doctors toward the use of ICT in the management of HIV/AIDS in Nigeria. The study adopted the survey method, with a population of 66 medical doctors involved in the management of HIV/AIDS in the study locations – Delta state university teaching hospital, Oghara, and Obafemi Awolowo university teaching hospital, Ife. The study established that Nigerian medical doctors have a positive attitude toward the use of ICT and perceive ICT as an enabler for their search for current information on the management of HIV/AIDS, enabling them to reach more HIV/AIDS information seekers than face-to-face contact, and reach many who wants anonymity of their HIV/AIDS inquiries and status. Based on the findings, the study, therefore, concluded that: Nigerian medical doctors have a positive attitude toward the use of ICT in the management of HIV/AIDS, and that they perceive ICT to facilitate effective management of HIV/AIDS.

Keywords: Medical doctors' perception, medical doctors' attitude, ICT, management, HIV/AIDS, teaching hospital

Introduction

Around the world, many people including medical doctors perceive and have different attitudes toward the use of ICT. The adoption and application of information and communication technology (ICT) by medical doctors to the management of HIV/AIDS when considered against the complementary healthcare service, gives rise to superior patient care, efficiency, reduction in error rates, increased team-based health care, robust best-practices. Medical doctors especially those in the university teaching hospitals engage actively ineffective healthcare service delivery and produce a more efficient healthcare service (Fagerström, Tuveesson, Axelsson, & Nilsson 2017). Sapci and Sapci (2019, p. 623-635), alluded "ICT devices such as wearable devices and new diagnostic solutions have been shaping the future of healthcare". Park and Han (2017) averred that "electronic medical records (EMR) systems allow medical professionals to access various types of clinical data for individual patients electronically within each organization, p.

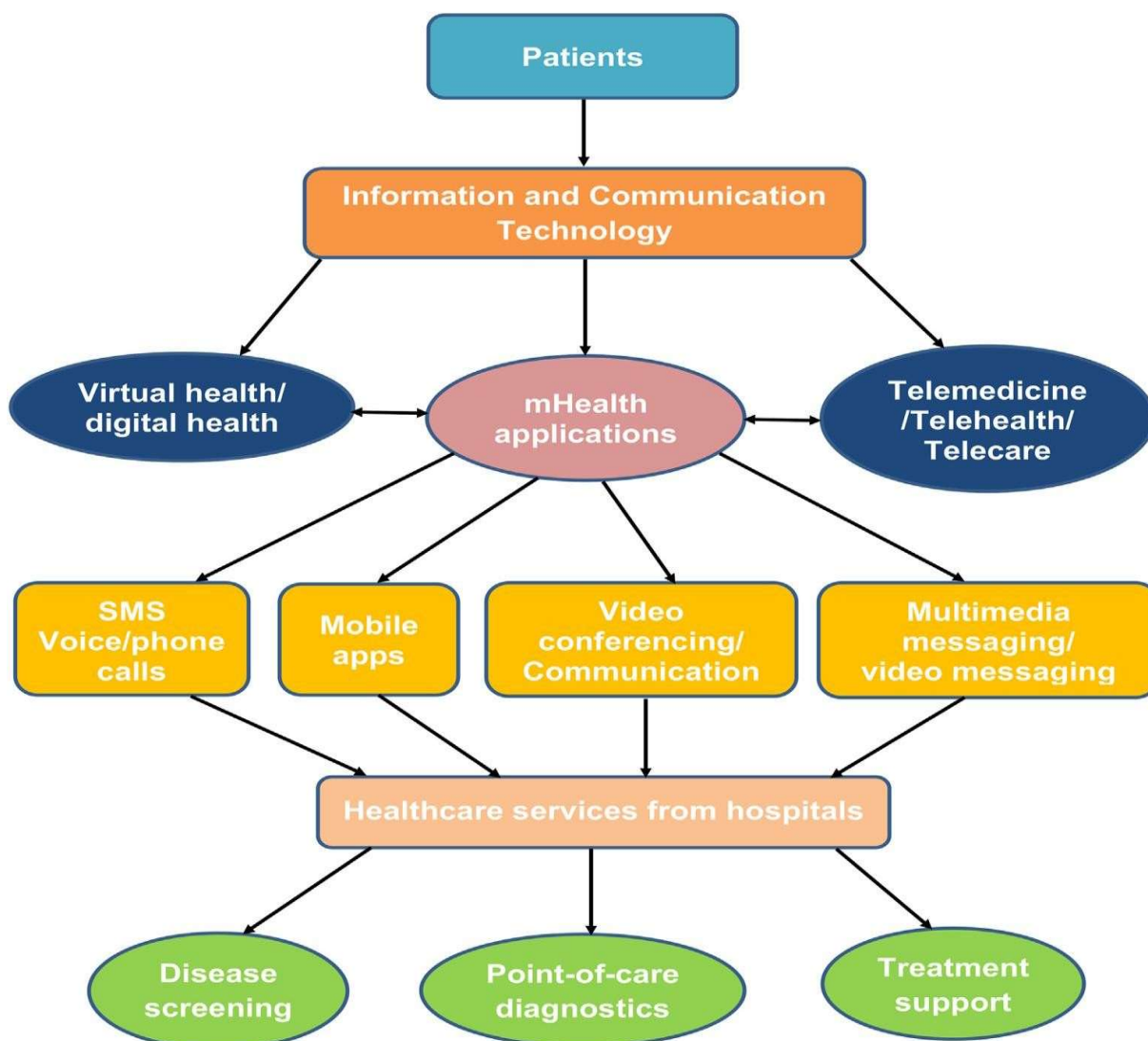
197". As such, the use of ICT by medical doctors for healthcare service delivery is significant as it will allow more productivity, teamwork, and as a direct result, more accessibility, higher- quality care, and a safer environment for patients (Gomes & Romão, 2018).

Santra, Mandal and Das (2019, p. 298) pointed out that "SSA constitutes 23.82 percent of the global disease burden but has one percent of health expenditure". To bridge the gap, medical doctors in Nigerian university teaching hospitals need to adopt and use ICT for the management of HIV/AIDS. Especially as the usefulness of ICTs transcends the daily applications in the clinics but has been adapted in the teaching of the medical practice (Milic, Ilic, Stanisavljevic, *et al.*, 2018). For example, consultations between doctors and patients formerly conducted using face-to-face methods are now done through telephone, SMS, social media, or e-mail, all of which are computer-mediated (Coleman, Herselman & Coleman, 2012). According to Gomes & Romão, 2018, p. 77), "ICT in health represents the integrated effort to collect, process, report and use health information and knowledge to influence policy-making, program action and research and further state that they are essential to the effective functioning of health systems worldwide". The perception and attitude of medical doctors toward the use of ICT for the management of various diseases require a balanced view to enable them effectively use the ICT in leveraging healthcare service delivery, as well as achieving institutional goals toward the attainment of the proposed MDGs and SDGs on health. To achieve this, there is the need for medical doctors to review their perception and attitude toward the use of ICT for effective management and possible eradication of HIV/AIDS.

Literature review

In recent years as stated by Latif, Qadir, Farooq, and Imran, (2017) technology-enabled healthcare systems can deliver care outside the traditional setting by keeping patients at remote locations, promoting adherence to medications, lowering readmission rates and reducing cost. ICT is considered a vital tool for any organizational transaction and in the delivery of services to its clients (Ndekwa, 2015), including the field of the medical profession, particularly for the management of HIV/AIDS to the benefit of the entire world. Divall, Camosso-Stefanovic and Baker (2013, pp. 16-28), as well as Mickan, Atherton, Roberts, *et al.* (2014) corroborate that, "as the rate of adoption of handheld computers has increased, individual patterns of usage have moved from that of communication and personal diary management towards information seeking and decision support" (pp. 14-56). Clinicians can use handheld computers including smart and mobile phones "to search the internet for evidence and guidance on drugs and clinical conditions, use clinical decision support system (CDSS) and access highly detailed patient information from clinical and laboratory investigations" (Mickan, Atherton, Roberts, Heneghan & Tilson, 2014, pp. 14-56). For example, clinicians have adopted blogs, Twitter, and WhatsApp as social media applications already in use in Nigeria, and these applications are used for sharing HIV/AIDS- related information (Alonge, Kiai & Ndati, 2016).

Realizing the need for ICT in the field of medicine and medical practice, an increasing number of healthcare professionals use handheld devices to instantly access a vast amount of information via the internet and health applications (Mosa, Yoo & Sheets, 2012; Mickan, Atherton, Roberts, Heneghan & Tilson, 2014). ICT being a contrivance has changed information and data usage in all areas of human endeavour specifically mobile technologies used to support the achievement of health objectives (mHealth) proved to be the quickest growing area of eHealth, due to rapid advances in mobile applications and technologies and increasing coverage of mobile cellular networks (Cooper, Clatworthy, Whetham & EmERGE Consortium, 2017).



Source: A proposed patient pathway of using mHealth for accessing healthcare services (Osei & Mashamba-Thompson, 2021).

According to Osei and Mashamba-Thompson (2021), “the advances in mobile technologies and applications are driving the transformation in health services delivery globally”. Mobile health technologies have been recognized as a cheaper and easier approach to provide high-quality healthcare services to patients in low-and middle-income countries (LMICs) while its fragile health systems, high prevalence of tropical diseases, high rate of infectious disease, and others (WHO, 2017). It has also been observed that despite the relevance of mobile health to low-and middle-income countries for the transformation of healthcare services, its application is mostly predominant in high-income countries (WHO, 2017). Arising from this, some LMICs have integrated mobile health in their existing eHealth services (Sondaal, Browne, Amoakoh- Coleman, *et al.*, 2016). The penetration, acceptability, and use of mobile phones in LMICs have increased exponentially, to the extent that using mobile phones for healthcare-related services by LMICs could have a far-reaching effect than the traditional methods of disease control and prevention (Wood, Thomas, Budd, *et al.*, 2019; Osei & Mashamba-Thompson, 2021).

In a study conducted by Haluza, and Jungwirth, (2018) on ICT and the future of healthcare: aspects of pervasive health monitoring, it was found that experts perceived that the scenarios were highly innovative, but only moderately desirable and that their implementation could especially improve patients’ knowledge, quality of healthcare, and living standard. The health services consumers (HSC) are also characterized by greater knowledge and higher expectations for better services as well as their willingness to participate in the decision of their treatments. Hence, according to Kruk, Gage, Arsenault, *et al.* (2018), “what is needed are high-quality health systems that optimize health care in each given context by consistently delivering care that improves or maintains health, by being valued and trusted by all people, and by responding to changing population needs”. They further said that quality should not be the purview of the elite or an aspiration for some distant future; it should be the DNA of all health systems since it is a major human right requirement for good health.

ICT has been adopted and used by medical doctors in the treatment of various diseases across the globe. For example, hospital information construction in China has been developing in the last 30 years. In 2007, the National Statistical Information Centre of the Ministry of Health launched a survey on the 3,765 hospitals nationwide; the results showed that the hospital information system were still management information systems or clinical information systems (Liang, Zhang, Shen, *et al.*, 2020). They demonstrated how the system works, stating that the entire structure of the clinical data exchange system has three parts: a data center, medical institutions, and individual users, and that once the patients as individual users finish their clinical examinations (routine), relevant health information is generated and uploaded to the data center where important information is packaged according to the Enterprise Master Patient Index (EMPI).

According to Susanto (2018) smart mobile devices (SMDs) have been used in various areas such as engineering, education, healthcare, business, production, and logistics. The swelling incidences of SMD in healthcare organizations that have embraced mobile health, government,

and none-profit organizations, initiatives to advance the information and communication technology (ICT) supported it (Susanto, 2018). Again, Susanto (2018) pointed out that “mobile health makes it feasible for patients to collect and share relevant data at any time, not just when they happen to visit a clinic, allowing more rapid convergence to optimal treatment. Mobile health apps can contribute to a rapid, learning health system”.

From the foregoing, it is clear that ICT has been deployed to various aspects of the medical field, from the general practice to the specific adoption in STDs/HIV/AIDS interventions in the developed world. To facilitate quick and effective medical services by medical doctors in the various university teaching hospitals selected for this research, there is the need to establish which of the many ICT tools available in the market for HSCs are adopted and used within the teaching hospitals. Furthermore, there are various types of ICT tools that have been found useful in the medical field for the management of HIV/AIDS which are: Smartphone, personal digital assistants (PDAs), and geographic information systems (GIS). According to Kurland (2016, p. 111-127.) “GIS is a computerized system designed for the storage, retrieval, and analysis of geographically referenced data”; it uses advanced analytical tools to explore at a scientific level the spatial relationships, patterns, and processes of biological, cultural, demographic, economic, geographic, and physical phenomena (Kurland, 2016).

According to Singh, Gibbs, Estcour, *et al.*, (2017, p. 6) “sexual health is an under-explored area of Human-Computer Interaction (HCI), particularly sexually transmitted infections such as HIV”. There has been increased access and usage of smartphones in African communities (Kumar, Nilsen, Abernethy, *et al.*, 2013; Tufts, Johnson, Shepherd, *et al.*, 2015). Smartphone’s have been revolutionized to incorporate most features of the computer while retaining their original features of voice, short message services (SMS), video calls, and many other facilities to make it even more versatile for medical doctors to adopt and use in the management of HIV/AIDS.

The use of ICT by medical doctors has evolved over the years, its intervention was initially intended for treatment strategy for chronic diseases, but has presently diffused in countries with different levels of economic development (Mao, Lin, Wen, & Chen, 2020). More importantly, cell phones can offer cost-effective and efficient methods of improving medication adherence and overall health outcomes (Krishnan, *et al.*, 2015, p. 7). Again, the use of cell in mHealth interventions are emerging as innovative strategies to improve health, yet there remains insufficient evidence of informed implementation and scale-ups in HIV/AIDS management (Tomlinson, Rotheram-Borus, Swartz, & Tsai, 2013). Thus, there is a great need for more efficacy and effectiveness trials for its implementation and use in HIV/AIDS management (Krishnan, Ferro, Weikum, *et al.*, 2015, p. 8). However, since cell phones have permeated many fields of human endeavors and have been adopted and used in such fields in their service delivery, therefore, medical doctors in their healthcare services would not be left out. By implication, the evolving use of cell phones by medical doctors will continue until it is completely diffused in all areas of healthcare service delivery.

Mobile phone has thus become a ubiquitous instrument for overcoming healthcare challenges and delivers effective healthcare services by medical doctors. Moreover, it has provided the perfect means for medical doctors to reach patients in remote locations to assist in emergencies in combating HIV/AIDS (Isabona, 2013). The advent of GSM has greatly enhanced the exchange of information, especially in Nigerian teaching hospitals among health care professionals and between health professionals and patients (Isabona, 2013). The study by Olok, Yagos and Ovuga (2018) titled knowledge and attitudes of doctors towards e-health use in health delivery in government and private hospitals in Northern Uganda: a cross-sectional study found that the five most used ICT facilities and tools by healthcare professionals were a mobile phone, Microsoft PowerPoint, internet, flash disk/memory stick and e-mail. They concluded that the most preferred ICT tools used by doctors in Northern Uganda were mobile phones and computers.

Statement of the problem

HIV prevalence in Nigeria is relatively low standing at 3.2%, yet Nigeria is an enormous country where HIV infection remains an issue that demands a systematic and highly tailored intervention and has hardly leveraged ICTs to mitigate the spread of the pandemic (Awofala & Ogunde, 2018). Thus, the adoption of ICTs becomes a crucial tool for healthcare management and has been perceived to be a vital tool in leveraging HIV/AIDS awareness and training, outreach, information dissemination, and follow-up of patients. Hence, this study examines the perception and attitude of medical doctors toward the use of Information and communication technologies (ICTs) in the management of HIV/AIDS in Nigeria, especially in the university teaching hospitals within Nigeria; seeks the various factors that influence medical doctors' use of ICT in the management of HIV/AIDS; and the challenges medical doctors face while using ICT tools in the management of HIV/AIDS around the world and particularly in Nigeria, as well as how these can be ameliorated.

Objectives of the study

The major objective of this study is to examine the extent to which medical doctors in Nigerian university teaching hospitals have adopted and are using ICT for the management of HIV/AIDS. Hence, determine how medical doctors can use ICT to leverage the management of HIV/AIDS as well as for the monitoring and tracking of the spread of HIV/AIDS.

Research questions

The study addressed the following research questions:

1. To what extent have medical doctors in Delta State university teaching hospitals adopted and used ICT in the management of HIV/AIDS?

2. What are the perceptions of medical doctors in Delta State University teaching hospitals towards the use of ICT for the management of HIV/AIDS?

Methodology

Research design

The study adopted the descriptive survey research method and used only the questionnaire to elicit data from the medical doctors included in the study.

Population of the study

The population of this study is the entire medical staff responsible for the management HIV/AIDS at the Delta State University teaching hospital, Oghara. From this population, a total of 66 medical doctors responsible for the management of HIV/AIDS were included in the study.

Instrument for data collection

The predominant instrument for data collection was the questionnaire. A survey questionnaire was used to solicit quantitative data from the medical doctors on the perceptions of medical doctors toward the use of ICT in the management of HIV/AIDS at Delta State University teaching hospital.

Validity of the instrument

Validity enables a researcher to critic the expected finding of the research study. Validity is the degree to which a measure is free from bias and guarantees constant measure across the different items in the instrument and across time (Sekaran, & Bougie 2010). Hence, the quantitative instrument, which is the questionnaire, was presented to library and information science experts in the field of health informatics and medical doctors for the validation of the content of the instrument before it was distributed to the participants in the selected university teaching hospital in Nigeria.

Reliability of the instrument

According to Tavakol and Dennick (2011), internal consistency describes the extent to which all the items in a test measure the same construct, hence, connected to the interrelatedness of the items within the test. To ensure the reliability of the instrument, the instrument was reviewed by a team of medical doctors and a team of health informatics at the Ambrose Ali medical school, Ambrose Ali University, Ekpoma, Nigeria. Thus, the critical incidences and fundamental information relating to the tool were captured before the instrument was administered to the respondents.

Data collection

Data was collected through the use of the questionnaire. Copies were purposively administered to the selected medical doctors at the Delta State University teaching hospital

Data analysis

All duly completed instruments were selected for analysis. A total of 66 questionnaires were administered, out of which 60 were found usable as they were duly completed.

Results**Table 1: Extent of Use of ICT by Medical Doctors**

Use	VHE	HE	LE	VLE	\bar{x}
I use ICT to search for current information on the management of HIV/AIDS	34	23	3	-	3.52
I use ICT to circulate information on new drugs for the management of HIV/AIDS	18	28	9	5	2.98
I use ICT to circulate information on new distribution centers of HIV/AIDS drugs	12	22	20	6	2.67
I use my personal ICT tools in the management of HIV/AIDS	23	26	9	2	3.17
I maintain the ICT tools I use in the management of HIV/AIDS by myself	19	27	8	6	2.98
It does not matter if the use of ICT in the management of HIV/AIDS makes me work longer	14	23	13	10	2.68
I use ICT to motivate HIV/AIDS patients to routinely take their drugs	10	22	20	8	2.57
I use ICT to remind HIV/AIDS patients to routinely take their drugs	11	19	19	11	2.50
I use ICT to remind HIV/AIDS patients of their drugs collection/due date	11	18	22	9	2.52
I use ICT to counsel the general public on practices that cause HIV/AIDS infections and how to avoid them	15	22	16	7	2.75
ICT will enable medical doctors to reach more HIV/AIDS information seekers than face-to-face contact	32	20	6	2	3.37
ICT enables medical doctors to reach many who wants anonymity of their HIV/AIDS inquiries or status	30	23	6	1	3.37
Aggregate					Mean

2.92

Criterion Mean 2.50

Data presented in table 1 above revealed that the aggregate mean of 2.92 is higher than the criterion means of 2.50, which implies that to a high extent medical doctors use ICTs in the management of HIV/AIDS. Specifically, to a very high and high extent, medical doctors use ICT to search for current information on the management of HIV/AIDS (\bar{x} =3.52), reach more HIV/AIDS information, and reach many who wants anonymity of their HIV/AIDS inquiries (\bar{x} =3.37) respectively. It was also revealed that to a high extent medical doctors use their ICT tools in the management of HIV/AIDS (\bar{x} =3.17), maintain ICT tools they use in the management of HIV/AIDS by themselves, and circulate information on new drugs for the management of HIV/AIDS (\bar{x} =2.98) respectively. Furthermore, it was revealed that medical doctors to a high extent use ICT to counsel the public on practices that cause HIV/AIDS infections and how to avoid them (\bar{x} =2.75). ICT was also used to a high extent to motivate HIV/AIDS patients to routinely take their drugs (\bar{x} =2.57), remind HIV/AIDS patients for their drugs collection/due (\bar{x} =2.52), and remind HIV/AIDS patients to routinely take their drugs (\bar{x} =2.50).

Table 2: Perception and Attitude of Medical Doctors towards the Use of ICT in the Management of HIV/AIDS

Perception and Attitude	SA	A	D	SD	\bar{x}
I can use ICT tools in the management of HIV/AIDS	33	24	2	1	3.48
I am prepared to use ICT in the management of HIV/AIDS	31	28	-	1	3.48
I am comfortable using ICT in the management of HIV/AIDS	31	25	3	1	3.43
The government should provide ICT tools for medical doctors to manage HIV/AIDS	37	21	2	-	3.58
International organizations should provide ICT tools for medical doctors to manage HIV/AIDS	32	24	1	3	3.42
ICT industries should design ICTS with local content for effective management of HIV/AIDS	39	18	3	-	3.60
Individual medical doctors should acquire suitable ICT tools for their use in the management of HIV/AIDS	23	19	12	6	2.98
The use of ICT in the management of HIV/AIDS can help reduce the widespread of the epidemic	31	23	4	2	3.38
The use of ICT in the management of HIV/AIDS will expand the number of contacts per medical doctor	30	24	5	1	3.38
The use of ICT in the management of HIV/AIDS is feasible	32	26	1	1	3.48
The use of ICT in the management of HIV/AIDS is not	13	11	10	26	2.18

feasible					
To effectively manage HIV/AIDS with ICT, special and handy ICT tools is required	31	22	4	2	4.07
ICT training skills are required to effectively use ICT in the management of HIV/AIDS	26	28	4	2	3.30
The use of ICT in the management of HIV/AIDS can only be adopted through government policies	16	21	18	5	2.80
The use of ICT in the management of HIV/AIDS can only be fully adopted if implemented in phases	20	29	10	1	3.13
The use of ICT in the management of HIV/AIDS can only be achieved when it has been demonstrated	14	30	8	8	2.83
Aggregate					Mean
3.28					
Criterion Mean	2.50				

From table 2 above, medical doctors specifically hold the view that: to effectively manage HIV/AIDS with ICT, special and handy ICT tools is required (\bar{x} =4.07), the government should provide ICT tools for medical doctors to manage HIV/AIDS (\bar{x} =3.58), ICT industries should design ICTS with local content for effective management of HIV/AIDS (\bar{x} =3.60). Medical doctors equally hold the view that they can use ICT tools in the management of HIV/AIDS, they are prepared to use ICT in the management of HIV/AIDS and the use of ICT in the management of HIV/AIDS is feasible (\bar{x} =3.48) respectively, they are comfortable using ICT in the management of HIV/AIDS (\bar{x} =3.43), International organizations should provide ICT tools for medical doctors to manage HIV/AIDS (\bar{x} =3.42), use of ICT in the management of HIV/AIDS can help reduce the wide spread of the epidemic and use of ICT in the management of HIV/AIDS will expand number of contacts per medical doctor (\bar{x} =3.38) respectively, ICT training skills is required to effectively use ICT in the management of HIV/AIDS (\bar{x} =3.30), use of ICT in the management of HIV/AIDS can only be fully adopted if implemented in phases (\bar{x} =3.13), Individual medical doctors should acquire their suitable ICT tools for their use in the management of HIV/AIDS (\bar{x} =2.98), use of ICT in the management of HIV/AIDS can only be achieved when it has been demonstrated (\bar{x} =2.80).

Discussion of findings

From the findings of this study, it was observed that Nigerian medical doctors claimed that they use ICT to search for current information on the management of HIV/AIDS. This finding is corroborated in the study of de Lima, Galvão, de Oliveira Alexandre, *et al.*, (2016) in their study on information and communication technologies for adherence to antiretroviral treatment in adults with HIV/AIDS, their study found that “the integrated use of information and communication technologies with standard care promotes increased access to care, strengthening the relationship between patients and health services, with the possibility of mitigating the difficulties experienced by people with HIV in achieving optimal levels of adherence to drug

therapy”. Hence, the Perception and attitude of medical doctors toward the use of ICTs in the management of HIV/AIDS in Nigeria can be said to be positive with a genuine attitude toward ICT

De Wilde, Van Praet, Van Bosstraeten, and Rillof, (2019) in their study on equal access to health information: evaluating the use of a multilingual website in face-to-face consultations, “the results show that the website is most efficient in consultations characterized by high levels of institution-specific arrangements of talk enabling varying tasks, e.g. announcing the taking of an HIV test, asking the patient’s consent for taking an HIV test, exploring sexual risk behaviors and infections, empowering the patient in the search for reliable information on sexual health-related topics”.

In a study conducted by Fauk, Merry, Putra, *et al.*, (2019) on perceptions among transgender women of factors associated with the access to HIV/AIDS-related health services in Yogyakarta, Indonesia, it was found that “health professionals” positive attitudes during healthcare provision, social relationships between Waria and health professionals, proximity to healthcare facilities, free access to the services, and information sessions on HIV infection and prevention were also reported to enable participants’ access to the services”. In the current study, Nigerian medical doctors have a positive attitude toward the use of ICT in the management of HIV/AIDS as they claimed that they can use ICT in the management of HIV/AIDS.

Bloom, Berdou, Standing, *et al.*, (2017) in their study on ICTs and the challenge of health system transition in low and middle-income countries, argued that governments and other stakeholders can influence the application of ICTs to increase access to safe, effective and affordable treatment of common illnesses, especially by the poor. This situation is similar to the findings of the present study where medical doctors expect the government to provide ICT tools for medical doctors to manage HIV/AIDS. The lack of government support in the provision of relevant ICT tools has led to medical doctors’ use of personal ICT tools in the management of HIV/AIDS in Nigeria. The responses of the respondents found that ICT will enable medical doctors to reach more HIV/AIDS information seekers than face-to-face contact. In like manner, the study of Bloom, Berdou, Standing, *et al.*, (2017) harmonized with the current finding, stating that “several factors have impeded the rapid diffusion of ICT innovations at scale including the limited capacity of innovations to meet health service needs, the time it takes to build new kinds of partnership between public and private actors and participants in the health and communications sectors and the lack of a supportive regulatory environment.

As an indication of the perception and attitude of Nigerian medical doctors toward the use of ICT in the management of HIV/AIDS, findings showed that to effectively manage HIV/AIDS with ICT, special and handy ICT tools are required. Gimbel, Kawakyu, Dau, and Unger, (2018) supported this when they said: “effective and appropriate technologies to support health systems in the prevention and treatment of HIV/AIDS in low- and middle-income countries are needed to improve the efficiency and quality of health service delivery and ultimately improve health

outcomes". By implication, it means that quality healthcare services can be achieved with the provision and use of adequate ICT tools in healthcare service delivery.

Furthermore, medical doctors who have acquired some knowledge of ICT can adequately and efficiently make informed decisions that can positively impact the general medical practice and specifically the management of HIV/AIDS, more so, they can effectively collaborate with their peers in remote locations for immediate knowledge sharing and transfer (Ochonogor & Mutula, 2020). This is in line with the findings of the current study where medical doctors agreed that it is feasible for Nigerian medical doctors to effectively use ICT in the management of HIV/AIDS.

Conclusion

The perception and attitude of medical doctors toward the use of Information and communication technologies (ICTs) in the management of HIV/AIDS in Nigeria was found to be positive. The use of ICT by medical doctors enables them to: search for current information for the management of HIV/AIDS, reach more HIV/AIDS information seekers than face-to-face contact, including those who want anonymity of their HIV/AIDS inquiries or status. More to this, Nigerian medical doctors require ICT industries to design ICTS tools with local content to facilitate effective management of HIV/AIDS, the government should provide ICT tools for medical doctors to manage HIV/AIDS. Since the medical doctors have shown a positive attitude toward ICT tools in the management of HIV/AIDS, Nigerian medical doctors request that international organizations provide ICT tools for use by medical doctors to manage HIV/AIDS in Nigeria. Although the use of ICT by Nigerian medical doctors has not been fully diffused, they feel however that, ICT in the management of HIV/AIDS is feasible.

Recommendations

This study recommends that the university teaching hospital management and stakeholders should, sensitize medical doctors to diffuse their fears toward ICT use in HIV/AIDS management. More so, public university owners should strategically plan policies that can facilitate the training and retraining of medical doctors for the use of ICT in the management of HIV/AIDS, there should also be policy to encourage university teaching hospitals to adopt ICT in the medical programmes to develop future ICT, reliant medical doctors. ICT in Nigerian university teaching hospitals must as a matter of strategy adopt its implementation in segments, rather than full implementation

References

- Alonge, A. J., Kiai, W. & Ndati, N. (2017). Assessment of factors affecting social media use for HIV and AIDS communication among undergraduate students in South-Western Nigeria. *Journal of Development and Communication Studies*, 5(1), 56 – 77.
- Awofala, A. A., & Ogundele, O. E. (2018). HIV epidemiology in Nigeria. *Saudi Journal of Biological Sciences*, 25(4), 697-703.

- Bloom, G., Berdou, E., Standing, H., Guo, Z., & Labrique, A. (2017). ICTs and the challenge of health system transition in low and middle-income countries. *Globalization and health*, 13(1), 1-10.
- Coleman, P. (2019). An Examination of Positivist and Critical Realist Philosophical Approaches to Nursing Research. *International Journal of Caring Sciences*, 12(2), 1218-1224.
- de Lima, I. C. V., Galvão, M. T. G., de Oliveira Alexandre, H., Lima, F. E. T., & de Araújo, T. L. (2016). Information and communication technologies for adherence to antiretroviral treatment in adults with HIV/AIDS. *International journal of medical informatics*, 92, 54-61.
- De Wilde, J., Van Praet, E., Van Bosstraeten, K., & Rilof, P. (2019). Equal Access to Health Information: Evaluating the Use of a Multilingual Website in Face-To-Face Consultations, Language Support, Multilingual Website, Sexual and Reproductive Health Consultations. *FITISPos International Journal*, 6(1), 78-90.
- Divall, P., Camosso-Stefinovic, J. & Baker, R. (2013). The use of personal digital assistants in clinical decision making by healthcare professionals: a systematic review. *Health Informatics*, 19(1), 16-28.
- Fagerström, C., Tuveesson, H., Axelsson, L., & Nilsson, L. (2017). The role of ICT in nursing practice: an integrative literature review of the Swedish context. *Scandinavian Journal of Caring Sciences*, 31(3), 434-448.
- Fauk, N. K., Merry, M. S., Putra, S., Sigilipoe, M. A., Crutzen, R., & Mwanri, L. (2019). Perceptions among transgender women of factors associated with the access to HIV/AIDS-related health services in Yogyakarta, Indonesia. *PLoS ONE*, 14(8), e0221013.
- Gimbel, S., Kawakyu, N., Dau, H., & Unger, J. A. (2018). A missing link: HIV-/AIDS-related mHealth interventions for health workers in low-and middle-income countries. *Current HIV/AIDS Reports*, 15(6), 414-422.
- Gomes, J., & Romão, M. (2018). Information and Communication Technologies in the Healthcare: Future Trends for Project Success. *International Journal of Privacy and Health Information Management (IJPHIM)*, 6(2), 72-83.
- Haluza, D., & Jungwirth, D. (2018). ICT and the future of healthcare: aspects of pervasive health monitoring. *Informatics for Health and Social care*, 43(1), 1-11.
- Isabalija, S. R., Mayoka, K. G., Rwashana, A., & Mbarika, V. W. (2011). Factors affecting adoption, implementation, and sustainability of telemedicine information systems in Uganda. *Journal of Health Informatics in Developing Countries*, 5(2), 299-316.
- Isabona, J. (2013). The impact of telecommunication revolution in Nigeria: health sector perspective. *International Journal of Engineering Sciences*, 2(8), 415-420.
- Krishnan, A., Ferro, E. G., Weikum, D., Vagenas, P., Lama, J. R., Sanchez, J. & Altice, F. (2015). Communication technology use and mHealth acceptance among HIV-infected men who have sex with men in Peru: implications for HIV prevention and treatment. *AIDS Care*, 27(3), 273-282.
- Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., Leslie, H. H., Roder-DeWan, S., ... & Pate, M. (2018). High-quality health systems in the Sustainable Development Goals era: time for a revolution. *The Lancet Global Health*, 6(11), e1196-e1252.

- Kumar, S., Nilsen, W. J., Abernethy, A., Atienza, A., Patrick, K., Pavel, M., ... & Hedeker, D. (2013). Mobile health technology evaluation: the mHealth evidence workshop. *American Journal of Preventive Medicine*, 45(2), 228-236.
- Kurland, K. (2016). Geographic Information Systems in Health. In *Public Health Intelligence* (pp. 111-127). Springer, Cham.
- Latif, S., Qadir, J., Farooq, S., & Imran, M. A. (2017). How 5g wireless (and concomitant technologies) will revolutionize healthcare? *Future Internet*, 9(4), 93.
- Liang, J., Li, y., Zhang, Z., Shen, D., Xu, J., Yu, G., Dai, S., Ge, F., & Lei, J. (2020). Evaluating the application of health information technologies in China during the past 11 years: consecutive survey data analysis. *JMIR Medical Informatics*, 8(2), e17006.
- Mao, Y., Lin, W., Wen, J., & Chen, G. (2020). Impact and efficacy of mobile health intervention in the management of diabetes and hypertension: a systematic review and meta-analysis. *BMJ Open Diabetes Research and Care*, 8(1), e001225.
- Mickan, S., Atherton, H., Roberts, N. W., Heleghan, C., & Tilson, J. K. (2014). Use of handheld computers in clinical practice: a systematic review. *BMC Medical Informatics and Decision Making*, 14-56.
- Milic, N. M., Ilic, N., Stanisavljevic, D. M., Cirkovic, A. M., Milin, J. S., Bukumiric, Z. M., ... & Trajkovic, G. Z. (2018). Bridging the gap between informatics and medicine upon medical school entry: implementing a course on the applicative use of ICT. *PloS one*, 13(4), e0194194.
- Mosa, A. S., Yoo, I. & Sheets, L. (2012). A systematic review of healthcare applications for smart phones. *BMC Medical Informatics and Decision Making*, 12(1), 67.
- Ndekwa, A. G. (2015). Determinants of adopter and non-adopter of computerizing accounting systems (CAS) among small and medium enterprises (SMEs) in Tanzania. *International Journal of Innovative Science, Engineering and Technology*, 2(1), 438-449.
- Ochonogor, W. C., & Mutula, S. M. (2020). *The use of social media by medical librarians for inclusive engagement in the management of HIV/AIDS in Nigeria university teaching hospitals*. In Handbook of research on digital devices for inclusivity and engagement in libraries (pp. 1-24). IGI Global.
- Olok, G. T., Yagos, W. O. & Ovuga, E. (2018). Knowledge and attitudes of doctors towards e-health use in healthcare delivery in government and private hospitals in Northern Uganda: a cross-sectional study. *BMC Medical Informatics and Decision Making*, 15(87), 1-10.
- Park, Y. & Han, D. (2017). Current status of electronic medical record systems in hospitals and clinics in Korea. *Health Information Research*. Retrieved from: <http://doi.org/10.4258/hir2017.233.189>. Accessed 21 October 2018.
- Santra, S., Mandal, T. S., & Das, P. (2019). Leveraging Disruptive Technology Innovations for Healthcare Delivery in Sub-Saharan Africa. *ORF Issue Brief*, (298).
- Sapci, A. H., & Sapci, H. A. (2019). Digital continuous healthcare and disruptive medical technologies: m-Health and telemedicine skills training for data-driven healthcare. *Journal of Telemedicine and Telecare*, 25(10), 623-635.
- Sekaran, U., & Bougie, R. (2010). *Research methods for business: a skill building approach (5th ed.)*. United Kingdom: John Wiley and Sons Ltd.

- Singh, A., Gibbs, J., Estcour, C., Sonnerberg, P., & Blandforth, A. (2017). Are HIV smartphones apps and online interventions fit for purpose? *In proceedings of the 2017 International Conference on Digital Health. ACM*, 6 – 15.
- Sondaal, S. F. V., Browne, J. L., Amoakoh-Coleman, M., Borgstein, A., Miltenburg, A. S., Verwijs, M., & Klipstein-Grobusch, K. (2016). Assessing the effect of mHealth interventions in improving maternal and neonatal care in low-and middle-income countries:a systematic review. *PloS one*, *11*(5), e0154664.
- Susanto, H. (2018). Smart mobile device emerging Technologies: an enabler to Health onitoring system. In *High-Performance Materials and Engineered Chemistry* (pp. 241-264). Apple Academic Press.
- Swendeman, D., & Rotheram-Borus, M. J. (2010). Innovation in sexually transmitted disease and HIV prevention: Internet and mobile phone delivery vehicles for global diffusion. *Curr Opin Psychiatry*. *23*(2), 139-144.
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53.
- Tomlinson, M., Rotheram-Borus, M. J., Swartz, L., & Tsai, A. C. (2013). Scaling up mHealth: where is the evidence? *PLoS Med*, *10*(2), e1001382. Retrieved from: 10(2): e1001382.10.1371/journal.pmed.1001382 [PubMed: 23424286]. Accessed 27 April 2014.
- Tufts, K. A., Johnson, K. F., Shepherd, J. G., et al. (2015). Novel interventions for HIV self-management in African American women: a systematic review of mHealth interventions. *Journal of the Association of Nurses in AIDS Care*, *26*(2), 139-150.
- Wood, C. S., Thomas, M. R., Budd, J., Mashamba-Thompson, T. P., Herbst, K., Pillay, D., ... & Stevens, M. M. (2019). Taking connected mobile-health diagnostics of infectious diseases to the field. *Nature*, *566*(7745), 467-474.
- World Health Organization. (2017). Global diffusion of eHealth: making universal health coverage achievable: report of the third global survey on eHealth. *World Health Organization*. P. 156