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INFORMATION COMMUNICATION TECHNOLOGY: A STRATEGY IN HEALTH CARE SERVICE DELIVERY IN PRIVATE HOSPITALS

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ABSTRACT
Due to an ever increasing number of healthcare facilities across Kenya, the quality of healthcare service being given to patients has become a key factor that has led to huge performance gap among the existing private healthcare facilities. Healthcare facilities across the world are now putting service delivery quality as a priority towards enhancing patients' satisfaction. This study findings form additional literature to existing body of knowledge, benefit information communication technology service providers as well as healthcare service recipients. The specific objectives of the study were: to determine the effect of telemedicine; to establish the effect of mobile health as well as to assess the effect of wearable health technologies on health care service delivery. This study was guided by Unified Theory of Acceptance Use of Technology and SERVQUAL model. The target population was 720 hospital staff of Tenwek and Kaplong mission hospitals in Kenya. The sample size of 215 respondents was selected using stratified simple random sampling technique. Descriptive and explanatory research designs were used in the study. Self-administered questionnaires were used to collect data. The collected data was analyzed using descriptive and inferential statistics with the aid of Statistical Package for Social Sciences., Telemedicine, Mobile health and wearable health technologies had significant and positive effect on health care service delivery. Each of the technology tools including telemedicine, mobile health and wearable healthcare technology are important in ensuring quality in health care service delivery. The tools are supported by use of advanced technology, effective medication, qualified and competent human resource and sufficient doctor-patient ratio, effectiveness, efficiency and affordability of medical services. There is need for a comparative study on the health care service in faith-based healthcare institutions and Non-governmental organizations' operated healthcare institutions as a result of adoption of information communication technology. The hospital management should procure equipment and install infrastructure necessary in treatment and management of chronic illnesses. Research can be replicated focusing on other information Communication technology innovations and a targeting hospital patients.

Key words: Information communication technology, telemedicine, mobile health, wearable health technologies, Private hospitals

INTRODUCTION
According to Zineldin (2006) the current patients' dissatisfaction being witnessed in health care facilities results from poor service delivery and high medical costs in developing countries. Quality in healthcare service delivery is promoted by use of advanced technology, effective medication, qualified and competent human resource, sufficient doctor-patient ratio,

effectiveness, efficiency and affordability of medical services (Tam, 2007). Babakus, Yavas and Karatepe (2008) define service delivery as the effort to retain customers through quality services. Peters, Garg, Bloom,Walker, Brieger, and Hafizur (2008) developed a balanced scorecard to be used to survey healthcare facilities in order to fully develop healthcare services. The scorecard facilitates generation of data through interviewing of healthcare workers, facilitates surveys, client provider and exit interviews aimed at determining the level of customer satisfaction and perceptions on service delivery. The major components of the scorecard are indicators of quality service which include; availability and access, service safety, efficiency, quality and service equity. Berenson and Cassel (2009) observes that Poor service delivery in healthcare management as characterized by inefficiency and inconsistency was driven by supply chains which locked out clients from participating in decision making towards improving delivery services. Berman, Pallas, Smith, Curry and Bradley (2011) note a huge gap in service delivery despite hospitals having money and technology. According to Kotler (2011) the advancement in quality of healthcare products and services is driven by consumers who actively update service providers on their experiences through active research and communication so as to maximize healthcare benefits.

Healthcare sector in Tanzania is operated under devolved system where local authorities manage the healthcare services. According to Frumence,Nyamhanga,Mwangu and Hurtig (2013), Tanzanian local authorities failed to adequately respond to health challenges as a result of inadequate funding and delays of funds from the central government The scholars argue that is was also because of poorly trained local authorities healthcare workers and poor collaboration between healthcare workers and the local communities. Printz , Amenyah, Serumaga and Van (2013) attribute Tanzania's healthcare problems to lack of efficient healthcare supply system, poor financing , unreliable healthcare information communication technology infrastructure, and poor coordination among healthcare stakeholders.

The Vision 2030 developed by the government of Kenya considers health as a pillar in enabling the country to provide efficient, high quality and affordable healthcare services to all citizens with emphasis on a devolved healthcare system to offer preventive and curative care at the community level (Mangare, Omondi, Ayieko, Wakasiaka, Omoni, and Wamalwa, 2016). Findings of studies on Indian healthcare indicate evidence of poor service due to lack of capacity, poor Medicare incentives, poor accountability and governance among healthcare providers (Mohana, Hay, and Mor,2016).The scholars argue that despite India's achievement in healthcare products, information communication technology systems and medical equipment, many Indians continue to receive low quality primary healthcare. Benin being a low income country faces a myriad of healthcare challenges during service delivery. The major challenge is poor performance of medical equipment and information communication technology systems. It is caused by lack of experienced and technologically trained medical practitioners .The poor healthcare sector management policy by the government, coupled with political interference in the running of the health sector has led to poor service delivery in public and private healthcare facilities across the country (Houngbo,Buning, Bunders, Coleman, Medenou, Dakpanon and Horst,2017). Service industries like hospitals can be rated, assessed and ranked according to patients' experiences when receiving healthcare services (Kanu, Wilson, Sesay-Kamara, Bennett, Mehtar, Storr, and Kolwaite, 2019).

Covid-19 pandemic exposed Italy's weak healthcare sector. Despite the government's huge investment in the sector, the explosion of Covid-19 into a pandemic was greatly attributed to poor preparation by the government in spite of the existence of national and regional pandemic response units. Multilevel governance resulted in confusion and lack of coordination between the regional and national levels. The country has poor public-private collaboration in provision of healthcare services. Therefore the result was inefficiency in procurement of medical supplies hence poor service delivery (Vecchi, Cusumano and Boyer

(2020).With 47 million citizens, Spain battled with Corona Virus which led to high casualties putting the country among the worst hit globally. The country registered the highest infection rate and deaths per million people. Despite the 24 hour curfew by the government where essential service providers were permitted to work, the infections continued to rise. According to Shamasunder, Holmes, Goronga, Carrasco, Katz, Frankfurter and Keshavjee (2020) a decentralized and coordinated approach would have saved the situation in Spain. There is need for new legislation and an updated approach to deal with epidemics such as Covid-19.

Iran's healthcare service delivery has been greatly challenged by the Covid-19 Pandemic. According to Zandibar and Badrfam (2020) the Islamic Republic of Iran is doing fairly in the fight against Covid-19.The challenges include lack of financial resources to make timely procurement of medical equipment and supplies. In Nigeria, provision of Primary Healthcare as well as curative services is guided by the Nigerian constitution enacted in 1999. The constitution stipulates that efficiency in service delivery is promoted through decentralized healthcare service. Participation of all stakeholders and mobilization of the required resources is worth consideration. Kenya faces challenges in healthcare service delivery since the devolution of functions regarding health from the National government to the county governments in 2013. Frequent healthcare workers unrest has been attributed to poor remuneration of medical staff, lack of sufficient trained health workers and lack of appropriate medical equipment and information communication technology systems. County governments handle the provision of healthcare services at the county level while the national government is in charge of policy making and referral hospitals. According to Health Sector Analysis Report of 2013-2014, the citizens of Bomet County have been complaining of inefficiency in service delivery in the available healthcare facilities where relative efficiency level is 43.1% which is below average.

In the current study, health care service delivery was measured in terms of efficiency which was the average time taken before a client receives treatment, patient's progress from one stage to another. It was measured in form of average length of stay in hospital for admitted patients and the average waiting time for special appointments as a result of information communication technology. It was also measured in form of convenience which was in turn conceptualized in terms of accessibility, availability, affordability and flexibility. Another measure was reliability which was described in terms of consistency in service delivery. Reliability was also conceptualized in terms rate of failure of information communication technology system during use and usefulness in its life cycle. Collaboration as a measure of healthcare service delivery was conceptualized in terms of ease in employees working together. It was also conceptualized in form of knowledge sharing, teamwork and consultations during service delivery. Responsiveness as a measure of health care service delivery was conceptualized in terms of flexibility among healthcare workers in adapting to use of information communication technology in service delivery.

OBJECTIVES

To determine the effect of telemedicine on health care service delivery

To establish the effect of mobile health on health care service delivery in private hospitals

To assess the effect of wearable health technologies on health care service delivery in private hospitals

RESEARCH HYPOTHESES

Ho_I: Telemedicine has no significant effect on healthcare service delivery in private hospitals

Ho_2: Mobile health has no significant effect on healthcare of service delivery in private hospitals

Ho_3: Wearable health technologies have no significant effect on healthcare service delivery in private hospitals

LITERATURE REVIEW

Unified Theory of Acceptance and Use of Technology was developed by Venkatesh, Morris, Davis and Davis having thoroughly studied previous theories developed in 2003.The theories include Theory of Reasoned Action(TRA) by Fishbein and Ajzen in 1975,Technology Acceptance Model(TAM) by Davis in 1989; Model of PC Utilization(MPCU) by Thompson, Higgins, and Howell in 1991, Innovation Diffusion Theory (IDT) by Moore and Benbasat 1991.They also studied Theory of Planned Behavior(TBP) by Taylor and Todd in 1995; Social Cognitive Theory (SCT) by Compeau and Higgins in 1995. Other parent theories include one developed by Venkatesh and Davis in 2000; Motivation Model (MM) by Davis, Fred, Richard and Paul in 2006. The theory is linked to mobile health which was a study variable in health service delivery in private hospitals in Bomet County, Kenya.

In 1985, Parasuraman, Zeithaml and Berry developed SERVQUAL model from the following ten dimensions of service quality; tangibility, reliability, responsiveness, competence, access, courtesy, communication, credibility, security as well as understanding. Parasuraman, Zeithaml and Berry (1988) conducted further research on service quality and among ten elements of service quality; only tangibility, reliability and responsiveness remained constant while the remaining seven determinants were synthesized into assurance and empathy. This resulted in the modified version of SERVQUAL model which has five service quality dimensions namely; tangibility, employees' appearance and available facilities, reliability of carrying out service delivery consistently and accurately, responsiveness of employees to customer demands, assurance that can translate to customer confidence on services as well as empathy on how the organization provide care and attention to customers. Buttle (1996) recommends SERVQUAL model use in measuring customers' perceptions towards service delivery. SERVQUAL model addressed the current study variables of reliability and responsiveness. The model established that adoption of information communication technology improves service delivery through responsiveness and reliability. The theory failed to address efficiency, convenience and collaboration variables. However, they were covered in current study.

Wanjau, Muiruri, Ayodo and Eunice (2012) studied employee competence, adoption of technology, type of channel used, financial resources and technological advancements as dependent variables of quality of healthcare service. The study, however, did not focus on variables which were considered in the current study. Oyegoke (2013) used interviews and surveys to study the adoption and utilization of information communication technology in Nigerian hospitals while the current study used questionnaires during data collection. The current study used descriptive research design. Phichitchaisopa and Naenna (2013) concentrated on factors affecting the adoption of information Technology by randomly sampling hospital departments but stratified sampling was used in the current study. Muraya (2014) focused on factors influencing utilization of health services and concluded that medical prescription, product efficiency, healthcare infrastructure, staff attitude, professionalism, compassion, communication and courtesy greatly influenced service delivery. The current study focused on telemedicine, mobile health and wearable health technologies in service delivery. Wood and Williams (2014) employed cluster sampling technique to investigate decision making in healthcare management in relation to adoption of information communication technology. Stratified sampling technique was used in the current study. Muturi and Namusonge (2014) investigated the role of financial resources on information communication technology performance. However, the current study examined the quality of healthcare service delivery as a result of adoption of information communication technology in private hospitals.

A study carried out by Wesso (2014) in South African public hospitals, on the perceived quality of healthcare services and patients' satisfaction relied on the generic theory, the

Nordic perspective and the Gap theory. The current study used Unified Theory of Acceptance Use of Technology and SERVQUAL model. Nyaggah (2015) used Innovations-Diffusion theory and contingency theory when investigating the factors influencing adoption of information communication technology in public hospitals in Kenya. Nderitu (2016) investigated service delivery quality based on tangibility, responsiveness, empathy, healthcare infrastructure and staff professionalism leaving. The current study focused on efficiency, convenience, collaboration and reliability as measures of service. Mwangi (2017) investigated the role of financial resources, department of Information technology, security and privacy as factors influencing adoption of information communication technology in public hospitals. The current study was carried out in private hospitals and focused on telemedicine, mobile health and wearable technologies.

METHODOLOGY

Descriptive research design provided a clear picture of the situation as it naturally happens as recommended by Barnes, Burns and Grove (2003). This involves defining, explaining and describing, comparing and contrasting and in addition, tabulation of quantified information collected from the field. The target population comprised doctors, clinical officers, nurses, pharmacists, laboratory technicians, ophthalmologists and interns. For sample size 30% of the target population was computed as recommended by Mugenda and Mugenda (2003). The the sample size was 215 respondents was selected using stratified random sampling technique. Self administered closed and open-ended questionnaire was used to collect data and analyzed using descriptive and inferential statistics with the aid of statistical package for social sciences. Content validity was determined through pilot study and construct validity using theories and conceptualization of study variables. Cronbach's Alpha method with aid of statistical package for social sciences was used to compute the coefficient of reliability.

During the interpretation of quantitative data, descriptive statistics were used. Analyzed data was presented by use of tables. Relationship between the use of information communication technology and health care service delivery in the selected private hospitals, regression analysis was used. Contact cell phone numbers were indicated on the questionnaire for any clarification required by the respondents. Unconditional anonymity and privacy of the respondents were guaranteed. Findings were never used in any form of disciplinary or legal investigations against the respondents or the organizations' management. These guiding principles were clearly outlined in the questionnaire. Raw data collected from the research questionnaire was scanned, saved and stored in a password- protected personal computer until 2025 for analysis and reference if needed. Research authorization was granted by management of the hospital, graduate school at Kenyatta University and National Commission for Science, Technology and Innovation in Kenya.

RESULTS AND DISCUSSION

This study targeted 215 respondents drawn from different departments in medical profession. Those who completed filling in the questionnaires were 169 representing a response rate of 78.6 percent. Gall and Borg (2007) asserts that, a response rate of over 60% of the target is adequate for a study. Therefore, the response rate of

Table 1 Information Communication Technology

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Standard Deviation
Telemedicine has bridged distance gap between this hospital and rural communities through home-based healthcare	34.9	36.1	17.8	11.2	-	3.9	1.0
Telemedicine saves lives	79.9	18.9	-	0.6	0.6	4.8	0.5
Telemedicine is expensive to use	50.9	47.3	0.6	0.6	0.6	4.5	0.6
Telemedicine helps in management of chronic	31.4	39.1	23.7	5.9	-	4.0	0.9

illnesses

Average	**49.3**	**35.4**	**10.5**	**4.6**	**0.3**	**4.3**	**0.8**

Source: Research data (2020)

Results in Table 1 indicates that to a moderate extent the technology has bridged distance gap between the hospitals and rural communities through home-based healthcare (mean of 3.9), leading to a slight increase in home based healthcare (standard deviation of 1.0).Telemedicine is strongly useful in saving lives (mean of 4.8) but variance in lives saved is low (standard deviation of 0.5) It is an expensive technology to use (mean of 4.5) but the cost did not affect its use (standard deviation of 0.6). Telemedicine helps in management of chronic illnesses (mean of 4.0) but variation in chronic illness is low (standard deviation of 0.9).

The technology links the healthcare service providers to the clients by facilitating storage; processing, prompt retrieval and exchange of information hence solve service delivery challenges (Bukachi and Walsh, 2007). Its use improves treatment processes and quality of healthcare (Christensson, 2010). This is because the provision of quality healthcare services relies heavily on exchange of information between patients and medical staff. Information communication technology helps in reducing paperwork, decrease workload of healthcare workers, reduce medical errors and increase efficiency during service delivery (Honka, Kaipainen, Hietala, and Saranummi 2011). According to Gatero (2011) there is need to develop and integrate hospital information communication technology systems in healthcare service delivery. The author argues that it will promote accuracy in disease diagnosis, treatment and general medical care and avoid costly and risky multi-data entry points which may cause medical errors. According to Wasonga (2015) information communication technology has been used widely in managing patients' records electronically and as a backup for the records. The author argues that it eases tracking of patients' health progress and leads to effective healthcare service delivery in both private and public hospitals. The current study sought to establish the effect of information communication technology strategies which included telemedicine, mobile health and wearable health technology on heath care service delivery. In order to lower the costs involved in adoption of information communication technology in healthcare management, it is advisable to utilize the existing infrastructure and equipment which are easily accessible as argued by Benard (2019). The current study investigated the effect of telemedicine, mobile health and wearable healthcare technology in service delivery in the selected private hospitals in Bomet County, Kenya. Telemedicine was conceptualized in terms of the level of use of teleconferencing, teleconsultation, medical imaging and remote patient monitoring. Mobile health was measured using the frequency of use of mobile phones, tablets and personal digital assistants during service delivery. Wearable health technologies were conceptualized on the level of use of heart rate monitors, hearing aids, blood sugar monitors and blood pressure monitors.

Table 2 Usefulness of information communication technology innovations in improving service delivery in their respective institutions

	Strongly Agree	**Agree**	**Moderate/ Neutral**	**Disagree**	**Strongly Disagree**	**Mean**	**Standard Deviation**
Telemedicine	53.8	26.6	11.8	4.1	3.6	4.2	1.0
Mobile Health	35.5	47.9	5.3	5.3	5.9	4.0	1.1
Wearable health technologies	30.8	51.5	-	11.2	6.5	3.9	1.2
Average	**47.9**	**36.8**	**5.5**	**5.3**	**4.4**	**4.2**	**1.0**

Source: Research data (2020)

Findings indicated that Information Communication Technology innovations are very useful in telemedicine (mean of 4.2) with slight variation (standard deviation of 1.0). The technology innovations were also found to be very useful in mobile health (mean of 4.0) causing a slight

variation (standard deviation of 1.1). The innovations had a moderate usefulness on wearable health technologies (mean of 3.9) and led to some variation (standard deviation of 1.2).

Chandler and Redman (2012) argue that information communication technology innovations are a continuous process that arises from vigorous research and development endeavors by scholars. The authors claim that endeavors in turn culminate in the production of effective and efficient information systems aimed at enhancing service delivery in healthcare facilities across the world. It requires the use of computers and mobile technology enabled devices. The argument shows that there is inseparable relationship between computers and information communication technology networks as well as mass media which include television sets used to pass information. The introduction of blockchain technology in healthcare Information Communication technology is geared towards exchange of vital information while ensuring high integrity and protection of patients' confidential data during information sharing. This new innovation will empower the users and enable them achieve their goals in health (Engelhardt 2017). According to Asif-Ur-Rahman, Afsana, Mahmud, Kaiser, Ahmed, Kaiwartya and Taylor (2018) there is need to adopt an heterogeneous cloud-based information communication technology powered by mist and fog computing and the internet. It will provide efficient conventional and real-time data exchange for useful healthcare service delivery. Jungwirth and Haluz (2019) argue that Smartphone apps are the major tools for healthcare service delivery. Using these Information Communication technology tools; patients can access a wide range of health and fitness services. The technology empowers users to monitor their health while benefiting from collaborative quality health services. According to Zonneveld, Patomella, Asaba and Guidetti (2020), healthcare service delivery achieves optimum results when Information Communication Technology systems are put into use. Th scholar argues that technology intervention in healthcare promotes consistency and improves participation of patients setting up and working towards attaining their health goals. The adoption of the technology helps healthcare organizations to reach out and serve a larger population as compared to face-to-face manual system.

Table 3: Telemedicine and Health care service delivery
This section indicates the level of agreement by respondents on telemedicine.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Standard Deviation
Teleconferencing has enhanced collaboration with international experts and stakeholders for improved service delivery	27.2	68.0	1.8	3.0	-	4.2	0.6
Teleconsultations use has promoted convenience during service delivery	45.6	46.7	7.7	-	-	4.4	0.6
Remote patient monitoring is key towards improved responsiveness to patients' medical needs.	63.9	32.5	1.2	2.4	-	4.6	0.6
Medical imaging using Telemedicine is reliable	17.8	52.7	25.4	3.0	1.2	3.8	0.8
Average	**38.6**	**50.0**	**9.0**	**2.1**	**0.3**	**4.3**	**0.7**

Source: Research data (2020)

Table 3 shows that collaboration with international experts and stakeholders led to improved service delivery as a result of teleconferencing (mean of 4.2) which caused little variation (standard deviation of 0.6). Teleconsultation use has promoted convenience during service delivery (mean of 4.4) whose variation was low (standard deviation of 0.6). Remote patient monitoring is key towards improved responsiveness to patients' medical needs (mean of 4.6) but the variation in responsiveness was low (standard of deviation 0.6) Medical imaging using telemedicine is reliable (mean of 3.8) with insignificant variation in reliability (standard deviation of 0.8).

Chetley, Davies, Trude, McConnell and Ramirez (2006) explain that telemedicine can be best reliable and cost effective way for the developed nations can use to reach out and aid the healthcare systems of poor countries across the world. There is a significant contribution of Teleconsultation to improved service delivery in healthcare management. The use of Telecommunication for information monitoring and exchange via emails, mobile phones and automated messaging services has led to significant improvement in healthcare service delivery. Video conferencing acts as a link between healthcare providers with their clients simultaneously through healthcare education. The equipment used in teleconferencing include television, digital camera, webcam and videophone among others (Verhoeven, Dijkstra, Nijland, Eysenbach and Pijnen, 2010). Telemedicine was established jointly by the Government and German Merck which aimed at enabling the rural areas access quality healthcare services through the use of Teleconferencing (Qin, Dzombak, Amin and Mehta 2013). About 100,000 Euros was invested in the program in the initial phase linking the medical experts at Kenyatta National Hospital to Machakos level four hospital, all in Kenya. The technology aimed at boosting research and development and provided a strong foundation for pharmacovigilance, community awareness and healthcare education.

According to Holmes, Suffian, Lackey and Mehta (2014) networked health Solutions improves access to pre-primary health services. In addition the network provides personal health information tracking, and opportunities for income-generation to women in rural Kenya through telemedicine. According to Wasonga (2015), telemedicine can be put in two categories; real-time and pre-recorded diagnosis, treatment and prevention of ailments from a distance. Kangethe, (2018) concludes that telemedicine enables patients to carry out self-monitoring , disease management and improvement in adherence to medication. Kamotho and Bukachi, (2020) explains that telemedicine implemented in rural Africa led to improved blood pressure monitoring, effective treatment and patients' management resulting in promotion of universal healthcare provision. According to Dodoo, Al-Samarraie and Alzahrani (2021) the wide adoption of telemedicine in health care service delivery across the Sub-Saharan Africa, is yet to be fully utilized in the fight against Covid-19.The current study findings enable the researchers to recommend use of telemedicine in health care service delivery because it facilitates exchange of information between patients and healthcare providers.

Table 4: Use of Mobile Health during Health care Service Delivery

Statement	Strongly Agree	Agree	Moderate /neutral	Disagree	Strongly Disagree	Mean	Standard Deviation
Use of cell phones to communicate with patients is convenient	32.5	33.1	33.7	0.6	-	4.0	0.8
There is improved efficiency in use of tablets to communicate healthcare information with patients	27.2	39.6	33.1	-	-	3.9	0.8
Personal digital assistants facilitates teamwork among hospital staff	42.0	43.2	10.7	3.6	0.6	4.2	0.8
Mobile computers are efficient to use for service delivery	52.1	46.2	1.2	0.6	-	4.5	0.6
Mobile health improves service delivery in this hospital	46.7	50.3	2.4	-	0.6	4.4	0.6
Average	**40.1**	**42.5**	**16.2**	**0.9**	**0.2**	**4.2**	**0.7**

Source: **Research data (2020)**

Findings revealed that use of cell phones to communicate with patients is convenient (mean of 4.0) but led to low variation in communication (Standard deviation of 0.8). There is moderate efficiency in use of tablets for communicating healthcare information to patients (mean of

3.9) though a low variation in information (Standard deviation of 0.8). Personal digital assistants largely facilitate teamwork among hospital staff (mean of 4.2) but cause little variation on teamwork (Standard deviation of 0.8). Mobile computers are efficient to use for service delivery (mean of4.5) with a small variation (standard deviation of 0.6). Mobile health to a large extent improves service delivery in hospitals (mean of 4.4) whose variation was low (Standard deviation of 0.6).

Cole-Lewis and Kershaw (2010) argue that Mobile health initiative which is instrumental in care and treatment of patients is an emerging information communication technology strategy being adopted globally by several healthcare facilities. The authors affirm that M-health field is accruing evidence that technology integration within the health sector has great potential to promote better health communication. The scholars claim that the technology influence positive healthy lifestyle, improve decision making by health professionals and clients, and enhance healthcare quality by improving access to health information and communication where this was previously not possible. There is ample evidence in the scholarly literature that demonstrates the usefulness of information communication technology tools such as M-health interventions (Telemedicine, web-based strategies, email, mobile phones, mobile applications, text messaging and monitoring sensors) in reducing adverse effects of diabetes and hypertension in developed countries (Vodopivec,Jamsek, De Jongh, Gurol,Urganci, Atun and Car, 2012).According to Free, Philiphs, Watson, Galli, Felix and Edwards (2013) mobile health involves the use of mobile devices such as cell phones, smart phones and tablets, under a global network to deliver health services and information. According to Leach-Lemens (2013) use of short message services (SMS) phenomenally improves the rate of early infant diagnosis (EID) amongst those pregnant mothers infected with Human-Immuno deficiency Virus. It help in prevention of mother–to-child transmission (PMTC) program in Kenya hence improves customer satisfaction. Mobile health is the use of mobile devices and global network to deliver health services and information. Mobile devices most commonly used include cell phones (feature phones, smart phones and tablets (Adibi, 2015). The successful use of M-health by medical doctors to improve health outcomes requires the institution to educate the doctors and other health team members on the benefits of M-health (Ehrlich, Chester, Kendall and Crompton (2017). The scholars advocate for the innovative use of mobile technology in healthcare practices. A strong partnership between the Dutch government, Pfizer Foundation, Care Play, Pharm Access Foundation and Safaricom has led to the introduction of M-Tiba Health wallet into the Kenyan M-Healthcare sector. Through this system, M-Pesa is used to keep donor funds and customers' accounts as well as transfer funds to accredited healthcare providers to facilitate smooth service delivery.

According to Fedele, Cushing, Fritz, Amaro and Ortega (2017) mobile health among the youth can lead to improved treatment processes when monitored closely by a qualified health practitioner as compared to low outcomes when given without caregiver. Mobile health is however influenced by individuals, family, community, and health care system domains. Zhao, Ni and Zhou (2018) observe that age affects use of mobile health services. From their study, middle age and elderly users of mobile health attach value to the ease of mobile health utility and shy away from adopting new information technology. This implies that mobile health is easily embraced by the young generation. Sim (2019) concludes that there is utility shift in use of mobile health. It is the shift from the earlier monitoring and descriptive tools to modern digital disease diagnosis, surveillance and treatment. The scholar argues that it has greatly improved healthcare service delivery despite barriers such as mobile health regulation policies, mobile health payment challenges as well as difficulty in identifying appropriate digital biomarkers.Moble health is revolutionalizing healthcare service delivery through the use of mobile health apps. Due to the emerging pandemics such as Covid-19, there is need for mobile health systems to meet the needs of patients. Schizophrenia has been widely managed

using mobile health systems. It has led to research and innovation in mobile mental health (Torous and Keshavan 2020).

Table 5: Use of Wearable Healthcare Technology during Health care Service Delivery

Statement	Strongly agree	Agree	Moderate /Neutral	Disagree	Strongly disagree	Mean	Standard Deviation
Hearing aids	66.3	9.5	14.2	8.3	1.8	4.3	1.1
Blood pressure monitors	68.6	20.1	11.2	-	-	4.6	0.7
Blood sugar monitors	50.9	47.3	0.6	0.6	0.6	4.5	0.6
Heart rate monitors	53.3	29.6	17.2	-	-	4.4	0.8
Average	**59.8**	**26.6**	**10.8**	**2.2**	**0.6**	**4.5**	**0.8**

Research data (2020)

Findings in the table 5 show that hearing aids oftenly enhance hearing (mean of 4.3) causing slight variation (standard deviation of 1.1). Wearable technologies are very useful in blood pressure monitoring (mean of 4.6) Variation in monitoring was low (Standard deviation of 0.7).The technologies are strongly useful in monitoring of blood sugar (mean of4.5) with a low variation (standard deviation of 0.6). Pacers are strongly useful in regulating heart beats (mean of 4.4) though a low variance (standard deviation of 0.8).

According to Bonato (2005) wearable health technologies help doctors monitor the heart rate, the patient's blood sugar level, the blood pressure, fever and other health indicators. These devices can be used to diagnose and treat several diseases so as to improve service delivery (Brady, Carson, O'Gorman, Moyna, and Diamond, 2006). According to Rutherford (2010) wearable healthcare technologies are spearheading a great paradigm shift in the health sector. The greatest contribution of wearable technologies delivery of healthcare services is its ability to monitor a patient's health status and gather useful information in service delivery (Chan, Esteve, Fourniols, Escriba and Campo 2012). Collier and Radolph (2015) discovered that there is a merger between fitness and wearable health devices. The most extensive adoption of wearable technologies is in the health sector (Mesut, 2015). According to Akshay, Venkatesh, and Kumar (2016), wearable healthcare gadgets offers much promise to improve healthcare service delivery for both patients and healthcare service providers these devices facilitate constant monitoring and data collection which are used in developing a pattern of patient behavior useful in healthcare service delivery.

Leonard, Silverman, Sherpa,Naegle, Kim, Coffman and Ferdschneider (2017), found out that wearable health interventions blended well with mobile health in management and treatment of ailments. Wearable sensor bands aided in tracking heightened emotions among users. Management of thoughts and feelings triggered by the immediate environment can be monitored consistently using wearable mobile health technologies. Wearable health devices having been recently introduced in the market have opened avenues for treatment of chronic illnesses through close monitoring and treatment. The devices are capable of doing instant assessment of patients' conditions and are empowered with several biosensors to transmit real-time information to be used when prescribing treatments (Dias and Cunha, 2018).According to Dinh-Le, Chuang, Chokshi, and Mann (2019) wearable health technology is instrumental in enhancing transparency between patients and chronic condition management in healthcare facilities. Wearable health gadgets facilitates movement of data from patients to doctors(Greiwe and Nyenhuis 2020). The author argues that they help in tracking patients' health progress thus empowering them to be managers of their own health. The scholar claims that wearable health devices are capable of transmitting crude responses signaling users to either halt their operations or proceed. Therefore it helps in preventing unforeseen health risks associated with lack of monitoring and control. Majority of wearable

health devices generate accurate personal wellness reports which aid in health coaching and guidance towards set health goals(Greiwe and Nyenhuis, ibid).

Table 6: Analysis of Variance on Telemedicine and Service Delivery using SPSS version 25.0.0.0

Model		Sum of Squares	Df	Mean Square	F	p-Value
1	Regression	46.455	1	46.455	156.176	.000[a]
	Residual	49.675	167	.297		
	Total	96.130	168			

A Predictors: (Constant), Telemedicine

B Dependent Variable: Service delivery

Research data (2020)

Analysis of variance determined whether there was significant effect of telemedicine on health care service delivery. A p value of 0.000 < 0.05 shows significance of telemedicine in service delivery

Table 7: Analysis of Variance on Mobile Health and service delivery using SPSS version 25.0.0.0

Model		Sum of Squares	Df	Mean Square	F	p-Value
1	Regression	78.329	1	78.329	734.833	.000[a]
	Residual	17.801	167	.107		
	Total	96.130	168			

A Predictors: (Constant), Mobile health

B Dependent Variable: Service delivery

Source: Research data (2020)

Analysis of variance was used to determine whether there was significant effect of mobile health on health care service delivery. A p value of 0.000 < 0.05 indicates there was significant positive effect of mobile health on health care service delivery.

Table 8: Analysis of Variance on Wearable Healthcare Technology and service delivery

Model		Sum of Squares	Df	Mean Square	F	p-Value
1	Regression	71.448	1	71.448	483.408	.000[a]
	Residual	24.683	167	.148		
	Total	96.130	168			

A Predictors: (Constant), Wearable healthcare technology

B Dependent Variable: Service delivery

Source: Research data (2020)

Analysis of variance was used to indicate whether there was significant effect of wearable healthcare technology on service delivery. A p value of 0.000< 0.05 indicates that there was significant positive effect of wearable healthcare technologies on health care service delivery.

Table 9: Analysis of coefficient using SPSS 25.0.0.0

Model		Unstandardized Coefficients		Standardized Coefficients	T	p-Value
		B	Std. Error	Beta		
1	(Constant)	-0.552	0.137		-4.018	0.000
	Telemedicine	0.176	0.075	0.066	2.347	0.012
	Mobile health	0.185	0.069	0.122	2.681	0.043
	Wearable healthcare technology	0.426	0.082	0.376	5.172	0.000

a Dependent Variable: Service delivery

Source: Research data (2020)

Table 9 shows results of analysis of coefficients of study variables using the model;

$y = -0.552 + 0.176X_2 + 0.185X_3 + 0.426X_4$

A unit increase in telemedicine leads to 0.176 units increase in health care service delivery holding other factors constant. A unit change in mobile health causes 0.185 units increase in health care service delivery when other variables remain the same. Health care service delivery increases by 0.426 units when wearable healthcare technology changes by a unit, other factors being constant. At 5% level of significance telemedicine had p value of $0.012 < 0.05$. The hypothesis "telemedicine has no significant effect on service delivery" was rejected. Mobile health had a p value of $0.043 < 0.05$ hence a rejection of the hypothesis "mobile health has no significant effect on health care service delivery". Wearable healthcare technologies had a p value of $0.000 < 0.05$ hence rejection of the hypothesis, "wearable healthcare technologies have no significant effect on service delivery.

CONTRIBUTION

The management of private hospitals benefits from the findings and recommendations in area of investment in information communication technology. Technology adds value to the work of employees in terms of efficiency in the delivery of optimal treatment and care to the patients. Internet networks and computers play a key role in facilitating use of telemedicine, mobile health and wearable healthcare technologies. It is an opportunity for communication and internet service providers to invest in modern effective equipment and systems which can facilitate efficient use of their services by the healthcare providers. Communication firms are obliged to engage in research and development towards development of advanced information communication technology healthcare systems. In addition the firms need to procure the best equipment for healthcare service provision. The study is important to the government in formulation of policies to establish public private partnerships in healthcare so as to realize the global millennium development goal of universal healthcare. The government can also use the research to identify best approaches towards involving the private healthcare providers as government's agents of quality healthcare. The findings from the current study calls for government's intervention in subsidizing the high cost of procuring modern information communication technology health care equipment for use in hospitals across the country. The study recommends that members of the society being healthcare beneficiaries should be sensitized on the importance of embracing use of technology in accessing healthcare services in hospitals.

CONCLUSION

Each of the technological tools including telemedicine, mobile health and wearable healthcare technology are important in ensuring quality in health care service delivery. The tools are supported by use of advanced technology, effective medication, qualified and competent human resource and sufficient doctor-patient ratio, effectiveness, efficiency and affordability of medical services. There is need for a comparative study on the health care service in faith-based healthcare institutions and Non-governmental organizations' operated healthcare institutions as a result adoption of information communication technology. The hospital management should procure equipment and install infrastructure necessary in treatment and management of chronic illnesses. Research can be replicated focusing on other information Communication technology innovations and a targeting hospital patients

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