

Full Length Research Paper

Awareness and acceptance of telemedicine by medical doctors working in public hospitals in the city of Douala

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Clinicians have been studying ways to apply computer technology to enhance healthcare for many years. However, the acceptance of telemedicine has tended to be slower in Africa. The objective of this study was to evaluate medical doctors' awareness of telemedicine and determine factors affecting its acceptance in Douala. A hospital-based cross-sectional study was conducted from February to May 2023 in public health hospitals in Douala, Cameroon. Among the 283 medical doctors who received a questionnaire, 252 were included in the study. To identify factors influencing telemedicine utilization, bivariate analysis and multivariate logistic regression were employed. The statistical significance level was set at $P < 0.05$. This study result showed female predominance 157 (62.3%) with mean age of 35.8 ± 6.8 years. Most of these doctors, 25 (64.1%), who admitted making use of these applications used WASPITO; 17 (43.6%) use these applications on occasion, while 32 (82.1%) use these applications for teleconsultation. The 39 (15.5%) medical doctors who use these applications have a very good perception of their effectiveness. No association was found between age, gender, specialty, year of service, willingness to use telemedicine and the usage of telemedicine applications. The use of telemedicine remains low in Cameroon. It would be important to improve understanding of telemedicine to ensure its use.

Key words: Telemedicine, awareness, acceptance, medical doctor, Douala, mobile health.

INTRODUCTION

Grigsby and Sanders (1998) stated that telemedicine refers to a variety of information and communication technologies in the health domain, although interactive video may be the most common medium. The origin of modern telemedicine applications was traced by a Dutch cardiologist called Willem Einthoven in 1905 through the

long-distance transfer of electrocardiograms (Ryu, 2010). When used with computers, mobile devices, or other digital devices, telemedicine is defined as software, programs, applications, platforms, and (online or offline) resources that incorporate text, audio, and visual stimuli for the exchange of reliable information for the diagnosis,

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treatment, and prevention of disease and injuries, research and evaluation, as well as the continuous education of healthcare professionals, all in the interest of advancing the health of the public (Oikononou and Patsala, 2021).

The usage of telemedicine applications grew globally as a result of the COVID-19 pandemic, with the United States (58%) and Sweden (58%) having the greatest percentages of telemedicine practice around the world (Charleston, 2021). Gao et al. (2022) found that as at 2019 in China, almost all of the 31 provinces and municipalities in mainland have established regional telemedicine centers. In Germany, 25% of doctors' offices offered video consultations in March 2020, whereas only about 2% offered these services in 2017 (Hajeket et al., 2022). The early uptake of telemedicine in Sub-Saharan Africa began in Ethiopia in 1980 under the HealthNet project. In Cameroon, telemedicine was first used in 2004 in maternal and child health through a mobile clinic network (Dodoo et al., 2022). A survey conducted in Yaoundé in 2021 revealed that 20.2% of physicians used teleconsultation services during the COVID-19 pandemic (Scott et al., 2005).

In 2016, there were 2.19 health facilities per 10,000 inhabitants (Ministry of Public Health of Cameroon, 2016). The World Health Organization (WHO) has classified Cameroon as having a severe shortage of health professionals. Lindwood (2022) found that with the growing use of smartphones, applications that may be downloaded or run online will become more essential for diseases diagnosis as well as patient monitoring and management. Telemedicine can help solve a shortage of medical professionals in Cameroon and enhance the health of patients in remote areas (Yari et al., 2019). Awareness and understanding the factors that affect telemedicine acceptance might hasten the process of its use. There is a gap on evidence on awareness, attitude, and practice of telemedicine among medical doctors. The objective of this study was to evaluate medical doctors' awareness of telemedicine and determine factors affecting its acceptance in Douala.

MATERIALS AND METHODS

Hospital-based cross-sectional study was carried out from the 15th of February 2023 to 15th of May 2023 in public hospitals in the city of Douala in Cameroon. These health facilities are namely: Douala General Hospital (DGH), Douala Gynaeco-Obstetric and Pediatric Hospital (DGOPH), Douala Laquintine Hospital (DLH), Douala Military Hospital (DMH), Bangue District Hospital (BMDH), Bonassama District Hospital (BSDH), Cite des Palmier District Hospital (CPDH), Deido District Hospital (DDH), Logbaba District Hospital (LDH), and New-Bell District Hospital (NBDH). All these health facilities are being received medical students for internship. This study population was medical doctors who work in the selected study area and setting were included all medical doctors aged 21 years and over working in the selected study area and setting and

who give consented to participate. Medical doctors were selected by simple random sampling. The minimum sample size using Lorentz formular with a proportion of 20.2% medical doctors who used telemedicine in Yaoundé in 2021 was 247 (Scott et al., 2005).

Ethical clearance was approved taken by ethical committee. All participants signed a consent form. Human rights, autonomy and confidentiality were respected. Medical doctors who met the inclusion criteria were approached at their respective posts. The structured pre-formed interview questionnaire was then administered to them. The questionnaire was pre-tested. The questionnaire enabled us to collect the following data: Sociodemographic data: age of participants, gender, religion, place of work, speciality in the domain of healthcare and their number of years in active service, level of knowledge and ability to use telemedicine applications, perceptions of practitioners in prevention, fight and follow up of patients using telemedicine applications and factors influencing the use of telemedicine by medical doctors.

All data collected was cleaned by evaluating for consistency of responses across questions where appropriate and participants were interviewed where necessary to explain disparities. Quantitative variables were presented as means or and medians while categorical variables were presented as frequencies or percentages. The Chi-squared test was used to evaluate significance of associations between predictor variables (age, gender, speciality, year of service, religion) and outcome variables (uses of telemedicine applications (THEA, WASPITO, OUCARE, e-SANTE) in Cameroon). Probability value of less than 0.05 was statistically significant.

RESULTS

The recruitment rate was 89.04% among 283 medicals doctors were interviewed, and 31 questionnaires were not returned and 3 were incorrectly completed. Table 1 shows that most of participants were female 157 (62.3) with a sex ratio M/F of 0.6. The predominant age group was 31-40 years 127 (50%). Additionally, the ages of the 252 medical doctors interviewed ranged from 24 to 57 years. The mean age and standard deviation were 35.8 ± 6.8 years. The majority of participants were general physician 98 (38.9%). Most participants 96 (38.1%) had between 1 and under 5 years of service.

Table 2 shows that most medical doctors, 225 (89.3%), are aware of telemedicine. Concerning availability of applications in smartphones of medical doctors, 164 (65.1%) are aware while 156 (61.9%) are unaware that this application can be used to consult anyone, anywhere and anytime. There is a relationship between awareness and telemedicine ($p=0.0000$). Majority of the participants, 213 (84.5%), had never used any telemedicine application in Cameroon while 39 (15.5%) reported having access to some of these applications. Again, these doctors who admitted making use of these apps application used mostly WASPITO 25 (64.1%) and the majority of participants used these applications occasionally, 17 (43.6%). Some of the participants, 32 (82.1%), used applications mostly for teleconsultations (Table 3). Among the 39 medical doctors who practice telemedicine using telemedicine applications in

Table 1. Socio-demographic characteristics of the respondents.

Variable		Number (%)
Sex	Female	157 (62.3)
	Male	95 (37.7)
Age group (year)	21-30	70 (28)
	31-40	127 (50)
	41-50	47 (19)
	≥ 51	8 (3)
Specialty	General physician	98 (38.9)
	Specialist in surgery	17 (6.7)
	Specialist in Internal Medicine	40 (15.9)
	Specialist in Gyneco-Obstetrics	27 (10.7)
	Specialist in pediatrics	20 (7.9)
	Specialist in Surgery and Internal Medicine	32 (12.7)
	Others	18 (7.1)
Years of service	0-11 months	9 (3.6)
	1-<5 years	96 (38.1)
	5-10 years	86 (34.1)
	>10 years	61 (24.2)

Table 2. relationship between awareness and telemedicine.

Variable	Awareness of: Number (%)		P-value
	Yes	No	
Existence of telemedicine	225 (89.3)	27 (10.7)	0.0000
Applications are available on their smartphone	164 (65.1)	88 (34.9)	0.00000
Applications can be used to consult anyone, anywhere and anytime	156 (61.9)	96 (38.1)	0.0000

Cameroon (89.7%) agree to the fact that these applications save time for both doctors and patient. Medical doctors who practice using these applications accepted that is a convenient way to receive medical care in Cameroon and agreed that medical doctors in Cameroon can provide quality health care using these applications (Table 4). Table 5 shows that no associations were found between the age, sex, years of service, specialty of participants and willingness to practice telemedicine with the P values all greater than 0.05.

DISCUSSION

Participants in the age range of 21 to 40 years accounted for 78.2%. This age group has been reported in the United States by Olson et al. (2011) to be more likely to use technology, with higher rates of acceptance of new technology. This presents a good opportunity for the

adoption of telemedicine applications by medical doctors working in Douala public hospitals. There was a female to male predominance with 62.3% of the participants being female. This study was similar to that with findings of Edoh et al. (2016) in India (60%). This is due to growing numbers of young female enrolling in medical schools. The majority of medical doctors who participated were general physician (38.9%), this is because most specialist were not encountered during data collection. Similar study in England, Wales and Scotland by Jones et al. (2010) was higher (49%); this may be due to differences in sample population.

This study set out to assess the awareness and ability to use telemedicine applications by medical doctors working in Douala public hospitals. It was found that most medical doctors (89.3%) were aware of telemedicine; this result is higher than that reported by Shiferaw and Zolfo (2012) in Ethiopia (61%), it is believed this difference may arise from the fact that technology evolves over time.

Table 3. Practice of use telemedicine applications in Douala.

Variable		Number (%)
Willingness to practice telemedicine	Yes	135 (53.5)
	No	57 (22.7)
	Neutral	60 (23.8)
Medical doctors who practice using applications	Yes	39 (15.5)
	No	213 (84.5)
Which apps do medical doctors use to practice?	THEA	6 (15.4)
	WASPITO	25 (64.1)
	OUI CARE	1 (2.6)
	e-SANTE	7 (17.9)
How often medical doctors practice using this apps?	Daily	4 (10.3)
	Weekly	6 (15.4)
	Monthly	12 (30.8)
	Yearly	0 (0.0)
	Occasionally	17 (43.6)
The use of these applications	Teleconsultation	32 (82.1)
	Follow up	3 (7.7)
	Tele-radiology	1 (2.6)
	Tele surgery	0 (0.0)
	Teleconference	3 (7.7)

Table 4 perception of practitioners using telemedicine applications.

Variable	Modality	Number (%)
Diagnosis of diseases and management of patients	Agree	25 (64.1)
	Neutral	7 (17.9)
	Disagree	7 (17.9)
Monitoring (follow up)	Agree	32 (82.1)
	Neutral	5 (12.8)
	Disagree	2 (5.1)
Transform future of Medicine in Cameroon	Agree	30 (76.9)
	Neutral	7 (17.9)
	Disagree	2 (5.1)
Save time for both medical doctors and patients	Agree	35 (89.7)
	Neutral	3 (7.7)
	Disagree	1 (2.6)
Convince and cost efficiency	Agree	27 (69.2)
	Neutral	8 (20.5)
	Disagree	4 (10.3)
Privacy assurance	Agree	16 (41.0)

Table 4. Cont'd

	Neutral	6 (15.4)
	Disagree	17 (43.6)
Feel save performing this exercise	Agree	25 (64.1)
	Neutral	12 (30.8)
	Disagree	2 (5.1)
Convenient way to receive medical care	Agree	27 (69.2)
	Neutral	7 (17.9)
	Disagree	5 (12.8)
Telemedicine promoted In Cameroon	Agree	32 (82.1)
	Neutral	6 (15.4)
	Disagree	1 (2.6)
Doctors provide quality health care via applications	Agree	23 (59.0)
	Neutral	14 (35.9)
	Disagree	2 (5.1)
Recommend the use of telemedicine to family and friends	Agree	25 (64.1)
	Neutral	7 (17.9)
	Disagree	7 (17.9)

Table 5. predictor variables associated with the use of telemedicine applications in Cameroon.

Variable	Modality	Use telemedicine application in Cameroon (number)		OR	CI	p-value
		Yes	No			
Age (years)	≤40	28	160	1	0.393-1.809	0.690
	>40	11	53	0.843		
Sex	Male	18	77	1	0.760-3.015	0.28
	Female	21	136	1.514		
Specialty	General physician	17	81	1	0.198– 2.349	0.510
	Specialist in surgery	4	13	0.682		
	Specialist in IM	5	35	1.469		
	Specialist in G&O	6	21	0.735		
	Specialist in pediatrics		19	3.988		
	Specialist in S&IM	4	28	1.469		
	Others	2	16	1.679		
Years of service	0-11 months	0	9	1	0.620-2.992	0.554
	1-<5 years	19	77	1		
	5-10 years	12	74	1.362		
	>10 years	8	53	1.463		
Willingness to practice telemedicine		135	57			

IM: Internal Medicine; G&O: Gyneco-Obstetrics; S: Surgery.

The use of telemedicine applications was still below average (15.5%), this result is lower than that reported by Scott et al. (2005) in Cameroon (20.2%), and these variations might be attributed to the COVID-19 pandemic. In more developed countries, like the one carried out by Charleson (2021) in the U.S. (58%) and Sweden (58%), because these countries are more advanced in technology.

Among the 39 medical doctors who practice telemedicine using telemedicine applications in Cameroon, 64.1% agreed these applications can be used in diagnosis of diseases and management of patients, 82.1% accede these applications can be used in follow up of patients, while 76.9% believe these applications can be used to transform the future of medicine in Cameroon. 89.7% approved that these applications can save time for both medical doctors and patient mean, while 43.6% disagree that these applications assure privacy of patient. 69.2% of those medical doctors who practice using these applications accepted that is a convenient way to receive medical care in Cameroon and 59% agreed to the fact that medical doctors in Cameroon to provide quality health care using these applications. 82.1% said telemedicine should be promoted in Cameroon and 64.1% consent to recommend the use of telemedicine to family and friends. These similar remarks have been reported in sub-Saharan Africa and in India (Edoh et al., 2016; Malhotra et al., 2020).

Result of factors influencing the use of telemedicine by medical Doctors revealed that 100% of medical doctors who do not practice telemedicine using telemedicine applications own a smartphone; this is similar to trends reported by Zurovac et al. (2013) in Kenya in 2012 where only 1.7% of healthcare workers were found to have smartphones. This could be explained by the fact that in 2012, smartphones were not as easy to purchase as they are now and that the authors graded only phones that the individuals presented to the facility on the day of the survey. This presents a potential for rapid uptake and easy integration of health technologies. 98.6% of medical doctors who do not practice telemedicine using telemedicine applications access internet daily. In several studies, access to internet is more than 90%; access is steadily increasing. Most Internet activity focuses on email and search in journals and databases, but there is a very wide range of activities. Professional email with colleagues and patients is low but increasing. The major factors discouraging usage are time, workload, and cost, while too much information, liability issues and lack of skills also feature as discouraging factors. Factors encouraging use are unclear, but overall patient satisfaction and belief in improved service delivery, time saving and demand from patients are factors. There is a trend that males use the internet more than females, young more than old and specialists more than generalists, but these differences are not across the

board, and show variations between studies (Masters, 2008). Technology barriers such as, poor connectivity, low band width, software availability, and some other factors where not evaluated in this study. This is because of low prevalence in the use of telemedicine applications. The majority of participants who do not practice telemedicine using the telemedicine applications in Cameroon reported that face-to-face consultation (63.8%) and physical examination (82.6%) is essential in daily medical practice. In contrast, majority of participants who do not practice telemedicine (57.7%) agreed to the fact that telemedicine applications can be used in case of medical visit and follow up. A study carried out by Balestra (2018) and Yang and Kozhimannil (2016) in U.S revealed some disadvantages of telemedicine include limitations with performing comprehensive physical examinations, possibilities for technical difficulties, security breaches, and regulatory barriers. Some critics to telemedicine use worry that telemedicine may adversely affect continuity of care, arguing that online interactions are impersonal and dangerous in that the virtual provider does not have the benefit of a complete history and physical examination to aid with diagnosis and treatment. Although face-to-face encounters are necessary in many circumstances in which auscultation or palpation is necessary, telemedicine should be considered as an adjunct and best used to supplement in-person visits Yang and Kozhimannil (2016). 89.2% were interested in getting training on telemedicine, meanwhile just 42.3% of participants were willing to practice telemedicine using telemedicine applications in Cameroon.

In contrast, a study conducted by Ncube et al. (2023) in Botswana all healthcare professional (100%) were willing to use and participate in telemedicine programs. The major limitation was information bias due to cross-sectional studies. Moreover, the recruitment rate was 89.04% because 31 questionnaires were not returned and 3 were incorrectly completed. However, results can be generalized because the sample size was representative.

Conclusion

Majority of medical doctors who participated in the study were aware of telemedicine. Unfortunately, only few practiced telemedicine applications. Overall, practitioners had very good perceptions about the use of telemedicine and most of these practitioners said telemedicine should be promoted in Cameroon. This shows that no associations were found between the age, sex, years of service, specialty of participants and willingness to practice telemedicine. It will be relevant to conduct the awareness of medical doctors practicing in rural areas and where internet access is challenging in Cameroun, mainly in outreach geographic areas.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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