The Effects of Mobile Phone Use in Clinical Practice in Cape Coast Teaching Hospital

Emmanuel Kusi Achampong[1], Gabriel Keney [2], Nathaniel Ofori Attah Sr.[3]

1. Department of Medical Education & IT, School of Medical Sciences, University of Cape Coast, Cape Coast, Ghana

2. Directorate of Academic Planning and Quality Assurance, University of Cape Coast, Cape Coast, Ghana

3. School of Medical Sciences, University of Cape Coast, Cape Coast, Ghana

Abstract

Background: Information technology has become an inevitable, constitutive element of the healthcare institution as well as health education. This study investigates the effects of mobile phone use in clinical practice at the Cape Coast Teaching Hospital. The use of mobile phones to access health information by health professionals has the potential to improve the provision of health service to the population. In addition, primary care physicians can use mobile phones to communicate with their patients before and after they are discharged, thereby improving the health of individual patients and the population at large.

Method: The study adopted the cross-section survey design and obtained data using questionnaire from 100 medical students (medical, nursing and midwifery students) through purposive sampling procedure. Descriptive statistics and Pearson Chi-square were used for the analysis.

Results: The results show that 98% of the respondents owned smartphones, thus, they are receptive to and can confidently use their phones to access medical information (65%). It also emerged that, respondents can render effective and continuous service to clients (90%) with assistance from mobile medical apps. Respondents dispelled fears that it was unethical to always depend on mobile apps for medical information. However, there was no significant relationship between using mobile apps to access medical information and ensuring effective and continuous service to clients ($p \leq 0.937$).

Conclusion: In spite of high patronage of mobile phone, respondents maintained that accessing mobile phones during medical practice does not interfere with the service delivery, rather it facilitates effective and continuous service, speed up access to healthcare information and helps to increase knowledge as well as improve care giving skills. Mobile phone use can ensure quick communication between health facilities and health professionals which can help control diseases of public health concern thereby improving the health of the population.

Keywords: apps, smartphones, medical information, health professionals, medical practice

Abbreviations: Applications (Apps), Deloitte Global Center for Health Solutions (DGCFHS), Cape Coast Teaching Hospital (CCTH), University of Cape Coast (UCC), Clinical Teaching Centre (CTC), College of Health and Allied Sciences (CoHAS)Correspondence: gabriel.keney@ucc.edu.gh

DOI: 10.5210/ojphi.v10i2.9333

Introduction

The third millennium saw the advent of paradigmatic shift in information technology and data use. There has been an increase in global internet usage in households and among individuals. For example, Ghana saw an increase in internet usage penetration from 25.5% in 2015 to 28.4% in 2016 [1]. This increase includes the use of downloaded applications (Apps) on mobile devices, such as smartphones, tablets and iPads. To date, smartphones remain a prevalent mobile device of choice in Ghana because of their capability to interface mobile telephony with advanced computing features, offering users ready access to apps [2,3]. There are currently more than 10,000 apps within the Apple App Store's "medical, health care & fitness" category alone [4]. Some of these apps are specifically designed for healthcare professionals such as medical calculators [5], logbooks [6], medical reference tools [7], medical guidelines such as resuscitation algorithms[5] and drug guidelines [6]. The use of apps, as well as other functions of smartphones, such as viewing patients' radiological images [8,9], and communicating with colleagues [10], permit healthcare professionals to perform numerous tasks at point of care centers. Apps usage in clinical practices has burgeoned in Africa in recent years; however, there is limited research of the efficacy of apps usage in clinical practices in the Ghanaian healthcare sector.

A recent study by the Deloitte Global Center for Health Solutions (DGCFHS), though from the standpoint of economics, drives the relevancy of engaging apps in clinical practices in African countries. The Delloitte report asserts that Apps "can strengthen and improve the current health care system and they have the potential to deliver healthcare to patients in the most remote areas" [11]. The work of Flanigan and McAloon, though not about apps usage in Africa, is indicative of the apps usage in clinical practices. Flanigan and McAloon found that drug dosage calculator apps increase doctors' and medical students' accuracy and confidence in drug dosage calculations [12]. In another study, Low et al. found that a specifically designed app improves healthcare professionals' performance in a simulated cardiac arrest emergency scenario [13]. Whereas Zanner et al. found that non-medically trained individuals' performance of cardiopulmonary resuscitation in a hypothetical emergency scenario was slower in those using a specifically designed app compared to those without an app [14]. Furthermore, the use of a specifically designed app also impeded the speed at which healthcare professionals assessed an ischemic stroke [12]. Thus, apps need to be rigorously evaluated prior to implementation within clinical practices or as a first aid tool to the public.

Although some medical apps appear to be efficacious because they assist healthcare professionals to provide adequate patient care, the use of mobile phones within clinical practice does come with

concerns. One such concern that has been raised is the risk of pathogen transfer [3,15,16]. It can be argued that mobile phones should be treated like all medical equipment (e.g., stethoscopes, pulse oximeters) in terms of cleaning them. However, using the same disinfectants to those used to wipe down standard medical equipment may damage mobile phones [3]. Placing a protective cover over mobile phones that can withstand the usual disinfectants used on medical equipment has been suggested but this would only be suitable for touch screen devices and not mobile phones with a built-in keyboard [3,16].

Smartphones interfering with medical equipment, especially in critical care settings, is another concern [17]. One study found that smartphones placed within 3 centimeters of critical care equipment produced interference [17]. However, this problem can be overcome by ensuring that smartphones are kept at a safe distance, one meter away from a critical care bed [17].

Another concern associated with using smartphones within clinical practice, i.e., treating patient information in a secure manner, is the problem of data or security breach should a smartphone be lost or stolen [2,18]. However, this concern can be mitigated if data is stored within programs that can be erased remotely when a smartphone is reported lost or stolen [19]. Closely related to this topic is that of patient confidentiality, which could be breached when in message or data transmission between and among medical colleagues [3,18]. Another issue of concern is whether privately owned mobile phones should be used for clinical purposes (e.g., taking photographs of patients' wounds), given that these devices are also used privately. Unless patient information can be securely separated from non-clinical information and erased remotely, the likelihood that patients' information may be compromised is a potential danger.

Despite the availability of thousands of medical apps [4], efficacy of data, and the awareness of potential concerns associated with using smartphones in clinical practice remains a major concern [16,19]. An underlying factor that propels this danger is the fact that there is no known evidence about healthcare professionals' use of and attitudes towards using smartphones in clinical practice. Low et al., found that after using an app in a simulated emergency resuscitation scenario, participants who were medical and healthcare professionals did not think that using such an app reflects poor training or that it appears unprofessional [13]. However, it must be kept in mind that Low et al.'s study involved a simulated environment, as opposed to real clinical situations, and did not obtain extensive information pertaining to healthcare professionals' attitudes towards using mobile phones in clinical practice setting [15].

The aim of the present study was to enumerate the number of healthcare professionals that use mobile/smart phones and apps during clinical practices. Pertaining to the issue of confidentiality, this study was particularly interested in establishing who owns the mobile phone, how it is used during a clinical practice and the purposes for which it is used (e.g., taking photographs of patients' wounds). This study limited the apps usage to healthcare professionals', exploring their attitudes towards using mobiles devices, especially smartphones within clinical practice. Furthermore, by way of comparison, the study seeks interest in healthcare professionals' attitudes toward internet use in clinical practice. the was guided by the following research questions:

1. What are the perceptions of healthcare trainees on the use of mobile phones in clinical practice?
2. How does the use of mobile phone affect the continuity of service?

3. How does the use of mobile phone affect access to healthcare?

Methods

Ethics

Respondents were assured that the information gathered is solely for academic purpose and were assured of the confidentiality of the information they will provide and therefore were instructed not to write their names or any identification on the questionnaire.

Design and Sample

The study used the cross-sectional survey design [20] and obtained its data using structured questionnaires. The target population included healthcare students (medical, nursing and midwifery students) and house officers. Purposive sampling technique was used to sample 100 participants for the study.

Study Area

Participants for the study were recruited from the Clinical Teaching Centre (CTC) of the College of Health and Allied Sciences (CoHAS), University of Cape Coast (UCC). Participants included medical and nursing students in the final year, and doctors and nurses on the staff of Cape Coast Teaching Hospital (CCTH).

Results

Table 1: Demographic characteristics of respondents (N = 100)

Item	Frequency	Percentage
Gender		
Male	39	39
Female	61	61
Age		
Below 20 years	14	14
20 to 24 years	39	39
25 to 29 years	29	29
30 to 34 years	11	11
35 to 39 years	7	7
Practical duration		
Eight months	21	21
Nine months	25	25
Twelve months	54	54

Own phone with internet access		
Yes	98	98
No	2	2
Own simple phone		
Yes	76	76
No	24	24

The results in Table reveals that majority (61%) of the respondents were females and fell within the typical tertiary students' age range between 20-24 years and another 29% within the age group of 25 to 29 years. The mean age was 20 years.

Again, it emerged that respondents had various duration of clinical practice at the time the data was collected for the study. The longest clinical practice involved the house officers and final year students who represented 54% of the respondents. Clinical practice for nurses was shorter compared to the other healthcare professionals.

Ninety-eight percent (98%) of the respondents at the Cape Coast Teaching Hospital, who participated in the study had smartphones which had access to the internet, however, another 76% of the respondents also indicated that they had simple phones, in addition to the smartphones, that can be used for calling and texting only. Simple phones, here refers to phones which cannot access information on the internet and basically with calling and texting capabilities. The respondents asserted that the simple phones were useful since it helped them make calls when the smartphones' battery runs down. It was observed that, clinical year medical students used their phones to watch videos on YouTube, chat on WhatsApp and Facebook platforms during service delivery.

Table 2: Perception on the Use of Mobile Phones in Clinical Practice

Items	Strongly Disagree *(%)*	Disagree *(%)*	Uncertain *(%)*	Agree *(%)*	Strongly Agree *(%)*
I can effectively use phones to access the information I need	6.0	12.0	17.0	26.0	39.0
I can easily troubleshoot problems in using mobile phones to access the internet	28.0	45.0	6.0	5.0	16.0
Mobile phone use in clinical practice is not a problem for me	3.0	12.0	4.0	56.0	25.0
I am concerned about the authenticity of clinical information available on the internet	8.0	11.0	6.0	49.0	26.0

I enjoy using mobile phones to find new information	8.0	16.0	13.0	37.0	26.0
Using mobile phones to get information is time consuming	18.0	21.0	7.0	32.0	22.0
Mobile phones can be used to access medical information anytime you need it	5.0	14.0	6.0	63.0	12.0

Majority of the healthcare workers at the clinical sessions have knowledge of how to use mobile phones to access information as shown in Table 2. Twenty-six percent (26.0%) and 39.0% of the respondents can effectively use mobile phones to access information on the internet. Similarly, 56.0% and 25.0% of the respondents specified that the use of mobile phones in clinical practice is not a problem to them. However, 73% reported difficulty troubleshooting problems related to internet access on their smartphones. These respondents usually relied on their colleagues to access information even though they have their own smartphones, they are not privy to solving it.

In addition, majority of the respondents (75.0% comprising; 49.0% agreed and 26.0% disagreed) were skeptical about the authenticity of the clinical information available on the internet. Almost everything that one is looking for is available online and so getting information from credible sources were of interest to the respondents. The 75.0% respondents usually used Medscape, Oxford handbook of clinical medicine and medical dictionary to find information using their phones

Furthermore, it was realized that using mobile phones to access information online is time consuming but it is worthwhile than making a mistake during service delivery. Thirty-seven percent of the healthcare workers agree that they enjoy using mobile phones to find new information. This is backed by 26.0% of the respondents who strongly agreed to the same item. The respondents (75.0%) might be enjoying this service because 63.0% agreed and 12.0% strongly agreed that mobile phones can be used to access medical information anytime when needed.

Table 3: Perceive Effects of Mobile Phone Usage on Continuity of Service

Items	**Strongly Disagree** ***(%)***	**Disagree** ***(%)***	**Uncertain** ***(%)***	**Agree** ***(%)***	**Strongly Agree** ***(%)***
Constant use of mobile apps does not help to internalize information	33.0	10.0	20.0	8.0	29.0
Mobile apps can always be used as a source of information on medical issues	10.0	29.0	10.0	38.0	13.0
In the absence of mobile apps, delivery of healthcare service becomes a problem	64.0	10.0	1.0	16.0	9.0

Without mobile medical apps, there cannot be effective and continuous service to the clients	90.0	8.0	2.0	0.0	0.0

Thirty-seven percent (37.0%); 29.0% strongly agree and 8.0% respondents asserted that mobile apps do not help to internalize information. Twenty percent (20.0%) of the respondents were uncertain on the use of mobile apps to internalize information. Thirty-three percent (33.0%) strongly disagreed that mobile apps do not help to internalize information.

Sixty-four percent (64.0%) of the respondents strongly disagreed that without mobile applications delivery of healthcare services would be a problem and supported by another 10.0% of the respondents.

Ninety percent of the respondents strongly affirmed that it is possible to deliver effective and continuous service to the clients without mobile application assistance. Again, continuity of care was achieved through specified review days that are prescribed for patients in addition to special clinic days that patients are aware of when coming to see their doctors or follow up on a workup case of concern. These service deliveries are effective and ensure continuity even when mobile applications are not patronized.

Table 4-*Effect of Mobile Phone Usage on Access to Care (N = 100)*

Items	**Strongly Disagree** ***(%)***	**Disagree** ***(%)***	**Uncertain** ***(%)***	**Agree** ***(%)***	**Strongly Agree** ***(%)***
Always depending on mobile apps for information is not ethical and can lead to low self-confidence	80	6	1	1	12
Mobile apps help to speed-up access to healthcare information	23	20	50	1	6
Errors in mobile apps can lead to fatal condition of patients	50	30	5	5	10
Without information from mobile apps and the internet, it will be difficult to serve patients better	90	8	2	0.0	0.0
Mobile apps and technology help healthcare professionals to improve upon their care giving skills and knowledge	79	10	5	3	3
Mobile apps help in getting quick access to healthcare when patients book for appointment	50	20	1	25	4

From Table 4, it evident that majority (80.0%) of the respondents strongly disagreed that it is unethical to always depend on mobile apps for medical information. These respondents believed that frequent checking of information on their smart phones does not lead to low self-confidence. Meanwhile, 50% of the respondents were uncertain that accessing mobile applications help to speed-up access to healthcare. The same statement was strongly disagreed by 23.0% with 20.0% also disagreeing

It was realized that mobile apps help in getting quick access to healthcare when patients book for appointment. However, 70% respondents did not approve to this. They did not feel comfortable adding their clients to their medical calendars since the special clinic days were the official period to assess healthcare.

Table 5: Correlation between mobile phones use to access medical information anytime against effective use of phones to access the information

Variable	n	df	*p*
I can effectively use phones to access the information I need	100	16	0.001
Mobile phones can be used to access medical information anytime you need it			

Table 5 indicates that there is a significant relationship between the effective use of mobile phones to access information needed and mobile phones can be used to access medical information anytime you need it ($p \leq 0.001$). This result indicates that the respondents agree to the use of mobile phones to access medical information anytime the need arises.

Table 6: Correlation between using mobile apps to access medical information and ensuring effective and continuous service to clients

Variable	n	df	*p*
Mobile apps can always be used	100	8	0.937
as a source of information on medical issues			
Without mobile medical apps, there cannot be effective and continuous service to the clients			

From Table 6, there is no significant relationship between using mobile apps to access medical information and ensuring effective and continuous service to clients (p≤ of 0.937). Therefore, the statement that "Mobile apps can always be used as a source of information on medical issues" did not agree with the question "Without mobile medical apps, there cannot be effective and continuous service to the clients".

Discussion

The results reveal that even though age is not a constraint when it comes to tertiary education, majority (68%) of the respondents in the study could be identified within this age groups (20-29

years) of most students in tertiary institutions [21] and have positive attitudes towards smartphone [2,3]. These medical students were young, technology savvy and comfortable using contemporary technology in medical practice, especially to access needed medical information. The high proportion of respondents who owned smartphones reemphasize the findings by [1-7].

The results also showed that respondents expressed mixed feelings about the effects of mobile usage on continuity of service delivery. For instance, respondents were divided as to whether constant use of mobile apps help to internalize information. A section of the respondents asserted that it is better to use recommended text books to study and internalize the information therein than to use information from apps which can be debunked during a presentation. Others also believed that information, either received from mobile applications or in text books, can be studied or internalized. While some researchers such as [3] argue that mobile phones should be treated like all medical equipment (e.g., stethoscopes, pulse oximeters), in tandem with these findings [3,15,16], noted that although some medical apps appear to be efficacious because they assist healthcare professionals to provide adequate patient care, the use of mobile phones within clinical practice does come with concerns. To another group of the respondents, mobile apps can come in handy and you enjoy the luxury having all your notes on iPad or smartphones [16,17,19].

It also emerged that, respondents dispelled fears that service delivery will be disrupted in the absence of medical information on mobile apps. These respondents have acquired sufficient knowledge, training and skills to deliver service to patients. They also work as a team during service delivery which is not dependent on the use of smartphones. The study results reinforce conclusions by [11] that mobile apps "can strengthen and improve the current health care system and they have the potential to deliver healthcare to patients even in most remote locations." To this end, respondents in the study dispelled fears that using mobile apps to access medical information was unethical and can lead to low self-confidence. The findings again coincide with [12] who found that "drug dosage calculator apps increase doctors' and medical students' accuracy and confidence in drug dosage calculation" and improves healthcare professionals' performance [14]. The use of apps, as well as other functions of smartphones, such as viewing patients' radiological images [8,9], and communicating with colleagues [10], permit healthcare professionals to perform numerous tasks at point of care centers.

Conclusion

The use of mobile phones in Cape Coast Teaching Hospital (CCTH) is commonplace. Most clinical students, doctors, nurses and midwives are openly seen browsing, texting and talking on their phones during working hours in their various stations such as the emergency room, theatre, consulting rooms and the general ward. In spite of high patronage, respondents maintained that accessing mobile phones during medical practice does not interfere with the service delivery, rather it facilitates effective and continuous service, speed up access to healthcare information and helps to increase knowledge as well as improve care giving skills.

Quick access to health information using mobile phones have the potential to improve service provision to the population. Health professionals are quick to refer to protocols using mobile phones to ensure smooth delivery of quality service to clients. Mobile phone use has the potential to improve communications between healthcare facilities as well as health professionals.

Communication between health facilities can improve the health of the population through quick and immediate sharing of health information about public health issues.

References

1. *International Telecommunication Union (ITU), World Bank, and United Nations Population Division.* http://www.internetlivestats.com/internet-users/ghana/

2. Boulos MNK, Wheeler S, Tavares C, Jones R. 2011. How smartphones are changing the face of mobile and participatory healthcare: An overview with example from eCAALYX [Online]. *Biomed Eng (NY)*. 10, 24. PubMed

3. Phillippi JC, Wyatt TH. 2011. Smartphones in nursing education. *Comput Inform Nurs*. 29, 449-54. PubMed https://doi.org/10.1097/NCN.0b013e3181fc411f

4. Havelka S. 2011. Mobile resources for nursing students and nursing faculty. *J Electron Resour Med Libr*. 8, 194-99. https://doi.org/10.1080/15424065.2011.576623

5. Dasari KB, White SM, Pateman J. 2011. Survey of iPhone usage among anaesthetistsin England. *Anaesthesia*. 66, 620-31. PubMed https://doi.org/10.1111/j.1365-2044.2011.06747.x

6. Franko OI, Tirrell TF. (2011). Smartphone app use among medical providers in ACGME training programs. *Journal of Medical Systems* Online. http://www.springerlink.com/content/p6t82ph541835u75.

7. Franko OI. 2011. Smartphone apps for orthopaedic surgeons. *Clin Orthop Relat Res*. 469, 2042-48. PubMed https://doi.org/10.1007/s11999-011-1904-0

8. Baumgart DC. 2011. Smartphones in clinical practice, medical education, and research. *Arch Intern Med*. 171, 1294-96. PubMed https://doi.org/10.1001/archinternmed.2011.320

9. Fried JJ. 2012. Images at your fingertips. *Community Oncol*. 9, 141-42. https://doi.org/10.1016/j.cmonc.2012.03.005

10. Savel RH, Munro CL. 2011. Scalpel, stethoscope, iPad: The future is now in the intensive care unit. *Am J Crit Care*. 20, 275-77. PubMed https://doi.org/10.4037/ajcc2011149

11. *The mHealth opportunity in Sub-Sahara Africa: The path towards practical application*. Retrieved 5 July 2017 from https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/technology-media-telecommunications/deloitte-nl-mhealth.pdf

12. Flannigan C, McAloon J. 2011. Students prescribing emergency drug infusions utilizing Smartphones outperform consultants using BNFC. *Resuscitation*. 82, 1424-27. PubMed https://doi.org/10.1016/j.resuscitation.2011.07.014

13. Low D, Clark N, Soar J, Padkin A, Stoneham A, et al. 2011. A randomised control trial to determine if use of the iResus application on a smartphone improves the performance of an advanced life support provider

in a simulated medical emergency. *Anaesthesia*. 66, 255-62. PubMed https://doi.org/10.1111/j.1365-2044.2011.06649.x

14. Zanner R, Wilhelm D, Feussner H, Schneider G. 2007. Evaluation of M-AID, a first aid application for mobile phones. *Resuscitation*. 74, 487-94. PubMed https://doi.org/10.1016/j.resuscitation.2007.02.004

15. Josephson CB, Salman RA-S. 2010. Smartphone: Can an iPhone app help stroke physicians? *Lancet*. 9, 765. https://doi.org/10.1016/S1474-4422(10)70178-2

16. Osborne JDD, Phull JS, Matone LI. 2012. Might wipe clean covers for mobile phones reduce risk of spread of pathogens? *BMJ*. 344, 871. PubMed https://doi.org/10.1136/bmj.e871

17. Lieshout EJ, Van der Veer SN, Hensbroek R, Korevaar JC, Vroom MB, et al. 2007. Interference by new-generation mobile phones on critical care medical equipment. *Crit Care*. 11, R98. PubMed https://doi.org/10.1186/cc6115

18. Burns K., & Belton S. (2012). "Click first, care second" photography. *Medical Journal of Australia* 197, 265. Viewed on 5th September, 2016.

19. Nolan T. 2011. A smarter way to practice. *BMJ*. 342, d1124. PubMed https://doi.org/10.1136/bmj.d1124

20. Cresswell JW. (2003). Research design - Qualitative, quantitative and mixed methods approach. London: Sage Publications Inc.

21. OECD. (2013). Education at a glance: OECD Indicators. OECD Publishing, Paris.