

ORIGINAL ARTICLE**Patterns of Smartphone Usage among Clinicians in Clinical Settings**

ABDUL MAJID¹, FAHAD SARFRAZ², USMAN MEHBOOB³, FARRUKH SARFRAZ⁴, AYESHA ZUBAIR⁵, REHAN AHMED KHAN⁶

¹Associate Professor Head of Cardiology department Sheikh Zaid Medical College/Hospital Rahim Yar Khan

²Assistant Professor, Department of Medical Education, Islam Medical & Dental College, Sialkot

³Associate Professor Institute of Health Professions Education and Research Khyber Medical University Peshawar

⁴Assistant Professor Department of Medical Education Azra Naheed Medical College, Superior University Lahore

⁵Senior Demonstrator, Department of Biochemistry, Islam Medical & Dental College, Sialkot

⁶Professor of Surgery, Assistant Dean Medical Education, Riphah International University, Islamabad

Corresponding to Dr. Abdul Majid, Email: drmajidjahangir@hotmail.com, Cell: 0333-2200451

ABSTRACT

Background: Mobile device use has become a necessity in one's life. Much less is known about the patterns of mobile use by doctors while working in clinical settings. The aim of this study is to describe the patterns by which doctors use mobile devices in the clinical settings and doctors perceptions related to its use.

Methodology: This cross-sectional descriptive survey was conducted from October 2019 to March 2020 and included 200 doctors working in Sheikh Zayed Medical College Hospital, Rahim Yar Khan. After obtaining ethical approval and taking informed consent, participants were requested to fill a self-designed questionnaire. Identity was kept anonymous and data was organized and analyzed through SPSS software version 23.

Results: Out of 170 participants who responded, 92.4 % reported using mobiles phones in clinical settings for communication purposes, while 49.4 % used mobiles for information access. Only 18.2 % doctors used mobiles for organization and scheduling purposes. 27% percent doctors reported using social media application during clinical hours with Facebook being the most common application. Overall, the participants perceived use of mobiles to be useful and supplemental in patient care but issues of ethics and disruption in patient care with mobile usage needed to be dealt with.

Conclusion: There is increasing utility of mobile phones in the lives of doctors in all domains including clinical settings. Clear policies regarding mobile phone usage can help health professionals use this technology in a more productive way to improve patient care.

Key words: Mobile, clinical settings, clinicians

INTRODUCTION

With the widespread availability and low costs of the devices, mobile phones have become a vital communication medium in all socioeconomic groups though out the world^{1,2}. Mobile phone usage has increased from 740 million in 2000 to 8304 million in 2019³. Slowly but steadily, these mobile phones have become an essential commodity for every one and in almost all professional fields. In healthcare alone, the usage of mobile phone has increased markedly from 2012 due to commercialization strategies, multifunction applications in mobiles including writing notes, playing games, reading and organizing one's schedule⁴.

To add on, smartphones offer advanced computing with internet access and easy to use applications including social media and educational resource application. Recently, concept of mHealth (Mobile health) has taken the healthcare industry with a storm including usage of technology in healthcare⁵⁻⁷. mHealth focuses on accessing health data and providing communication between clinicians and patients through electronic access. Hence role of mobile phone has been further elaborated in health care industry.

In 2005, United Nations member states stressed in 58th World Health Assembly to use advancing information and communication technologies to enhance health care delivery, decision making, research and educational facilities though mobile phones⁸. Keeping this in background, it is important to study the patterns of usage of mobile phone in clinicians in Pakistan as upon research, limited data was found regarding patterns of usage of mobile phone among clinicians of Pakistan.

Also, mobile phones offer great opportunity to upgrade and health care systems even in remote areas where local clinics are not established. Also there can be disparities of mobile usage among clinicians of varying specialties and experience levels. An understanding of mobile phone usage by these clinicians can act as a pre-requisite for initiating effective mHealth based interventions as this will form the basis of doctors' readiness to use mobiles for patient care. The present study aimed to study the patterns of mobile usage among clinicians in workplace settings.

METHODOLOGY

This was a cross-sectional descriptive study conducted from October 2019 to March 2020. Study population included 200 doctors working in Sheikh Zayed Medical College Hospital, Rahim Yar Khan through non-randomized purposive sampling. A sample size of 170 doctors was calculated through online software, using confidence interval of 95% and margin of error of 5% with smartphone usage of 43% in Pakistan in the year 2019. Approval was taken from "Advanced Studies & Research Board" of The University of Lahore and the Sheikh Zayed Hospital Participation was voluntary and all data was kept anonymous after informed consent.

A self-designed questionnaire was developed after literature review and validated through pilot testing. Part A of questionnaire included demographic details of the participants and Part B included Likert scale with various statements to describe the patterns of mobile phone usage among clinicians. Participants signed an informed consent before they completed the questionnaire.

Statistical Package for Social Science- (SPSS) 25 for Windows 10 was used for data entry and analysis. Demographic data was presented using descriptive statistics for categorical variables (gender, age, years of experience, job grade at workplace) in the form of Frequency and percentage. Descriptive statistics were also applied to calculate the mean rating, and standard deviation of the variables given in other sections of the questionnaire.

RESULTS

Out of total of 200 questionnaires sent to doctors, 170 completed the questionnaires giving the response rate of 85%. (All the doctors reported owning a smartphone. Out of these 61(35.9%) were females and 109(64.1%) were males (Figure 1).

Fig 1: Gender distribution and mobile ownership among participants

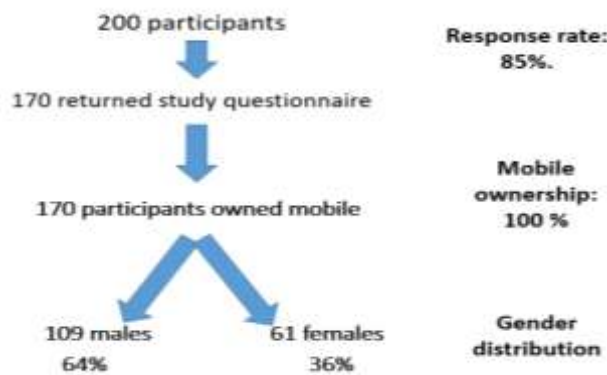


Table 1: Participants' demographic characteristics

Characteristics	Frequency	% age
Gender	109	64.1
Male	61	35.9
Female		
Age groups	93	54.7
24-29 years	28	16.5
30-34 years	21	12.4
35- 39 years	11	6.5
40 - 44 years	9	5.3
45 - 49 years	2	1.2
50 - 54 years	6	3.5
55 - 59 years	6	3.5
Mean Age (years)	33.31 ± 5.6	
Level of doctor		
House Officers	46	27.1
Medical Officers	20	11.8
Postgraduate trainee	58	34.1
Consultant	46	27.1
Clinical Experience(Years)		
1-3	87	51.2
4-6	30	17.6
7-9	12	7.1
10-12	12	7.1
13-15	5	2.9
16- 18	8	4.7
19 or more	16	9.4
Mean (Years)	5.96 ± 2.6	
Specialty		
Medicine	59	34.7
Surgery	28	16.5
Obstetrics/Gynecology	52	30.6
Pediatrics	27	15.9
ENT	4	2.4

Distribution according to age group showed that 93(54.7%) were between 24 to 29 years old, followed by 28(16.5%) for 30 to 34 years, 21 doctors (12.4%) for 35 to 39 years. Mean age of the doctor was 33.31 ± 5.6 years (Table 1).

When analyzed for professional seniority level, fifty-eight participants were post graduate trainees (34.1%), followed by 46 house officers and consultants each (27.1% each), and 20 medical officers (11.8%). Eighty-seven doctors had clinical experience of 1-3 years (51.2%), followed by 30 doctors having experience of 4-6 years (17.6%) and 16 doctors having experience of 19 years or more (9.4%). When segregated specialty wise, 59 doctors belonged to medicine specialty (34.7%), 52 belonged to Obstetrics and gynecology (30.6%), 28 belonged to surgery (16.5%), 27 doctors were from Pediatrics (15.9%) and 4 were from ENT (2.4%) (Table 1).

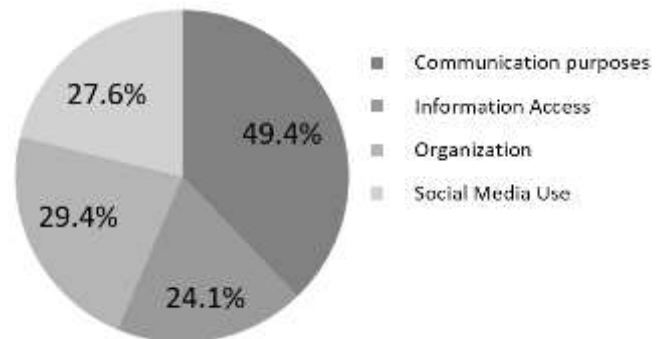
It was reported that 109 doctors (64%) used mobile phones in clinical settings for various reasons while 61 doctors (36%) didn't use mobiles at workplace during clinic hours. Doctors were asked to rate the places in hospital where they used the mobiles most frequently. (Table 2).The most rated place was the doctors' duty room which had a mean rating of 3.52 ± 1.78 out of 5-scale Likert Scale followed by the indoor wards (mean rating: 3.12 ± 1.061), outpatient department (2.30 ± 1.059). Emergency room (2.24 ± 1.1.23). Operation theatres were the rated the least of all. (1.84 ± 1.059) (Table 2).

Table 2: Mobile usage in various places of Hospital

	Mean	Std. Deviation
Outpatient Department	2.30	1.059
Indoor Wards	3.12	1.061
Operation Theatre	1.84	1.051
Emergency Room	2.24	1.123
Duty Room	3.52	1.078

Figure 2 shows main uses of mobile phones perceived by doctors in clinical settings which they use most regularly. Eighty-four doctors out of 170(49.4%) used mobiles in workplace for communication purposes, followed by 50 doctors (29.4%) using for organization purposes. Similarly, 41 doctors used mobiles in clinical settings for information access (24.1%) whereas 47 doctors admitted using social media applications in clinical settings (27.6%) (Figure 2). Figure 3 shows the breakup of the above mentioned reported uses of smartphones in clinical settings.

Fig. 2. Reported use of mobile phone in clinical settings



Perceived benefits of smartphone usage in clinical settings: All the doctors agreed on various benefits of using mobiles in clinical settings (Table 3). The most highly rated benefit(s) of using mobile in clinical settings included improving access of information as well as improving communication among staff members and patients (3.68 + 1.330 and 3.68 + 1.326 respectively) followed by improving work efficiency (3.48 + 1.315).

Fig. 3. Reported use of mobile phone in clinical settings

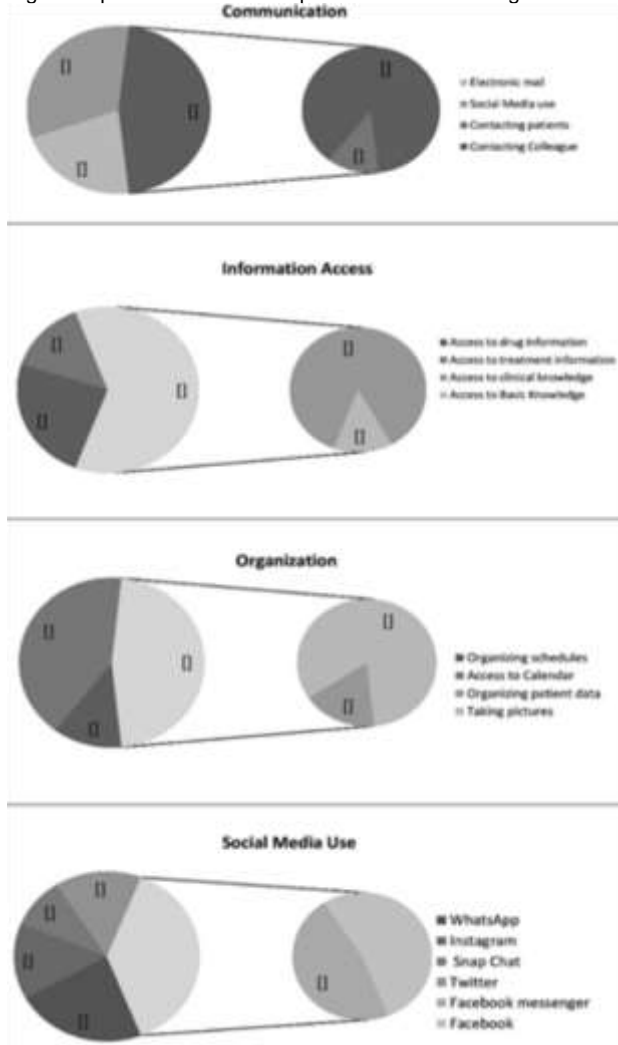


Table 3: Perceived benefits rating

Perceived Benefits	Mean	Std. Deviation
Improving Communication	3.68	1.326
Improve access of information	3.68	1.330
Ease of Use	3.51	1.279
Improving Efficiency	3.48	1.315
Improve clinical decision making	3.46	1.246
Improve clinical decision making	3.46	1.246
Improving quality of care	3.30	1.235
Improve patient safety	3.24	1.209
Safe to use	3.22	1.244
Improve patient satisfaction	3.06	2.513
Improving Communication	3.68	1.326
Improve access of information	3.68	1.330

Perceived Challenges of using smartphone in clinical settings: Doctors also reported various challenges of using mobiles in clinical settings, with distraction factor among staff being on top list (3.05 + 1.215) followed by causing unrest among patients or their families (3.04 + 1.178). There was also reservation of using mobile due to time wastage (2.87 + 1.238), getting in way of patient care (2.97 + 1.27) and finally the chances of introducing more errors. (2.75 + 1.105) (Table 4)

Table 4: Perceived Challenges rating

Perceived Benefits	Mean	Std. Deviation
Distract staff	3.05	1.215
Upset patient/family	3.04	1.178
Get in way of patient care	2.97	1.128
Waste of time	2.87	1.238
Introduce more errors	2.75	1.103

DISCUSSION

Our study demonstrated 100 percent ownership of smartphones by clinicians with 49.4% using them in workplace. In contrast, Abolfotouh et al demonstrated a smartphone utilization rate of 42.3 % among health care providers in Saudi Arabia with only 6.1% using various health care related applications in clinical settings⁹. Accreditation Council for Graduate Medical Education (ACGME) demonstrated that 85% of health care providers in California owned a smartphone with 56% using mobile phone in clinical settings¹⁰. In Australia, 91% of health professionals own mobile phone and 87% reported using it in their workplace ¹¹. Koehler et al demonstrated smartphone ownership in 75% of junior doctors and 99% use of smartphones by registered consultants in UK¹².

Mobile phone usage among doctors in clinical settings:

Our study demonstrated use of mobile phones in three main domains including communication, information access, self-organization and for entertainment purposes. Similar to our study, Black et al also described main functions of mobile in health care including facilitating communication among health professionals and patients¹³. Our study showed 49.4% doctors using mobile phone for communication purpose via phone calls and text messages among colleagues only and not for patients. Anshari (2016) demonstrated that mobile phone have become essential gadget in establishing communication with the patients and form and integral part of telemedicine or m-health¹⁴. Recently with the prevalence of Covid-19, this use for using mobile phones in tele health have increased rapidly in Pakistan establishing contact with patients¹⁵.

Out of 170 doctors, 157 (92%) reported to use mobile in clinical settings for information access in our study. Similarly, it was reported that more than 50% of doctors in UK from surgery department used various medical applications and more than 85% used the internet for information access during their clinical duty hours¹⁶. Another study by Liu et al demonstrated more than 80% use of mobile for accessing various information¹⁷ of smartphone and internet access as well as increase in mobile phone with changing times.

In the United Kingdom, around 80% of health professionals are reported to use their smartphones for organizing their lives including scheduling appointments with the patients¹². In contrast, only 31 out of 170 doctors

(18.2%) in our study used mobiles for organizing and scheduling on regular basis. The area of m-health seems to be deficient in our settings and hence the use of mobile for such function and scheduling seem to be less. Further studies can help us understand the factors behind low use of mobiles for scheduling and appointments.

153 doctors (90%) reported using social media applications in workplace in my study. As compared to another study done in Saudi Arabia, this rate was much less as they reported 37.9% doctors using social media applications in workplace¹⁸. Facebook was the most common social media application used in their study as well, followed by WhatsApp messenger.

Perception of Participants regarding mobile usage in clinical settings: All the study participants agreed on the perceived benefits of mobile usage during clinical hours. The most rated benefit of mobile usage remained ease of communication as well as improving access of information. Wallace S reported various features of mobile phone which are associated with ease of access to information and multimedia resources as well as flexible communication¹⁹.

Our study confirms the use of mobile phone for accessing information through various mobile tools and internet usage. This was in congruence with systematic review done by Mosa AS who demonstrated that mostly doctors use mobile tools for supporting evidence based medicine and hence help them in clinical decision making²⁰. Not only this, use of mobile phone is reported to improve the productivity among pharmacists²¹.

On the other hand, increased use of mobiles in workplace settings have arisen various concerns among the doctors in my study. One of the major concerns was wastage of time. Our study demonstrated that around 50% of doctors used mobiles for entertainment purposes in hospitals. Although, the use is mainly limited in the doctors' duty room, still this may lead to decreased productivity of the health professionals.

Also mobile phones have reported to be a distraction for doctors in clinical work. A study done in Australian hospital demonstrated a 12 percent increase in failures of clinical procedures as well as 12percent increase in clinical error with distraction of work by mobile phone²². Also, Smith et al reported that around 7.3 % of perfusionists accepted hindrance in their work performance while using mobiles during clinical work²³.

Study Limitations and Future directions: Our study was limited by a single clinical setting and the doctors working in that hospital. Perhaps a future study might help us understand the pattern of mobile use in other hospital especially where hospital management system has been introduced. Furthermore, future directions can include in-depth analysis of mobile on various uses mentioned in the study in order to understand the utility of mobile phones in improving clinical efficiency. An interesting comparison can also be done in mobile phone usage among various 'generations' working in hospital at a wider scale. Ethical implications of mobile usage from perspectives of doctors as well as patients can also help us understand this important aspect. Also, a wide scale readiness of clinicians for using mobiles for clinical practice is warranted.

CONCLUSION

Mobile phone usage has penetrated various aspects of clinician's life including communication, information access, organization and clinical decision making. Clear policies regarding mobile phone usage can help health professionals use this technology in a more productive way to improve patient care. Also establishing standards and policies within health care centers can ensure ethical use of mobile phones in clinical settings.

REFERENCES

1. Mobile phones and development - Calling an end to poverty | Business | The Economist [Internet]. [cited 2020 Mar 26]. Available from: <https://www.economist.com/business/2005/07/07/calling-an-end-to-poverty>
2. Aker JC, Mbiti IM. Mobile phones and economic development in Africa. *J Econ Perspect*. 2010 Jun;24(3):207–32.
3. Mobile subscriptions worldwide 1993-2019 | Statista [Internet]. [cited 2020 Mar 26]. Available from: <https://www.statista.com/statistics/262950/global-mobile-subscriptions-since-1993/>
4. Ustun C, Cihangiroglu M. Health care workers' mobile phones: A potential cause of microbial cross-contamination between hospitals and community. *J Occup Environ Hyg*. 2012;9(9):538–42.
5. Wickramasinghe N, Goldberg S. M-Health. In: *Medical Informatics*. 2011.
6. Free C, Phillips G, Felix L, Galli L, Patel V, Edwards P. The effectiveness of M-health technologies for improving health and health services: A systematic review protocol. *BMC Res Notes*. 2010;
7. Lupton D. M-health and health promotion: The digital cyborg and surveillance society. *Soc Theory Heal*. 2012;
8. Merson MH, Joklik Professor of Global Health Director W, Black RE, Edgar Berman Professor M, Mills AJ. 3rd Edition. Edited by [Internet]. 2012 [cited 2020 Mar 26]. Available from: www.jblearning.com.
9. Abolfotouh MA, BaniMustafa A, Salam M, Al-Assiri M, Aldebasi B, Bushnak I. Use of smartphone and perception towards the usefulness and practicality of its medical applications among healthcare workers in Saudi Arabia. *BMC Health Serv Res* [Internet]. 2019 Nov 12 [cited 2020 Mar 29];19(1):826. Available from: <https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-019-4523-1>
10. Franko OI, Tirrell TF. Smartphone app use among medical providers in ACGME training programs. *J Med Syst*. 2012 Oct 4;36(5):3135–9.
11. Koehler N, Vujovic O, McMenamin C. Healthcare professionals' use of mobile phones and the internet in clinical practice. *J Mob Technol Med*. 2013;2(1).
12. Sherwin-Smith J. A survey of mobile phone usage by health professionals in the UK. 2010;(December):1–10.
13. Black AD, Car J, Pagliari C, Anandan C, Cresswell K, Bokun T, et al. The impact of ehealth on the quality and safety of health care: A systematic overview. *PLoS Med*. 2011;8(1).
14. Anshari M, Almunawar MN. Mobile Health (mHealth) Services and Online Health Educators. *Biomed Inform Insights*. 2016 Jan;8:BII.S35388.
15. Shah MA. London doctor designs telemedicine corona helpline for Pakistan [Internet]. 2020 [cited 2020 Apr 14]. Available from: <https://www.thenews.com.pk/print/642108-london-doctor-designs-telemedicine-corona-helpline-for-pakistan>
16. Patel RK, Sayers AE, Patrick NL, Hughes K, Armitage J, Hunter IA. A UK perspective on smartphone use amongst

- doctors within the surgical profession. *Ann Med Surg.* 2015 Jun 1;4(2):107–12.
17. Liu C, Zhu Q, Holroyd KA, Seng EK. Status and trends of mobile-health applications for iOS devices: A developer's perspective. *J Syst Softw.* 2011 Nov 1;84(11):2022–33.
 18. Chan WS, Leung AY. Use of Social Network Sites for Communication Among Health Professionals: Systematic Review. *J Med Internet Res [Internet].* 2018 Mar 28 [cited 2020 Apr 18];20(3):e117. Available from: <http://www.jmir.org/2018/3/e117/>
 19. Wallace S, Clark M, White J. "It's on my iPhone": Attitudes to the use of mobile computing devices in medical education, a mixed-methods study. *BMJ Open.* 2012 Jan 1;2(4):e001099.
 20. Mosa ASM, Yoo I, Sheets L. A systematic review of healthcare applications for smartphones [Internet]. Vol. 12, *BMC Medical Informatics and Decision Making.* BioMed Central Ltd.; 2012 [cited 2020 Apr 19]. p. 67. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22781312>
 21. Aungst TD. Medical applications for pharmacists using mobile devices. *Ann Pharmacother [Internet].* 2013 Jul [cited 2020 Apr 19];47(7–8):1088–95. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23821609>
 22. Attri J, Khetarpal R, Chatrath V, Kaur J. Concerns about usage of smartphones in operating room and critical care scenario. Vol. 10, *Saudi Journal of Anaesthesia.* Medknow Publications; 2016. p. 87–94.
 23. Smith T, Darling E, Searles B. 2010 Survey on cell phone use while performing cardiopulmonary bypass. *Perfusion [Internet].* 2011 Sep [cited 2020 Apr 19];26(5):375–80. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21593081>