

Awareness and Attitude of Healthcare Workers towards Telehealth in Cairo, Egypt

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Abstract

Background: Telehealth is delivering health care services remote from health-care facilities using telecommunications. Egypt is aiming for Universal Health Coverage; this increases the demand of telehealth in routine health services. **Objective:** to measure the awareness of telehealth health care workers of primary health care units and to evaluate the effect of an orientation program on primary health care workers' awareness and acceptance of application of telehealth. **Methodology:** This was an intervention study among health care workers. A self-administrated valid questionnaire for health care workers was designed, the questionnaire consists of different domains of knowledge in addition to advantages, disadvantages, security and necessity perceptions. Each domain consists of Likert scale questions of 5 points. The questions were scored as the worst answer (1) and the best (5). A total of 109 questionnaires were filled by participants who spent at least 6 months in primary health care units. Then the health care workers were attended an orientation program and the questionnaire was re-filled once more. A total of 104 was recollected. Ethical issues were considered. **Results:** 50.5% of health care workers were aware of telehealth; 66.7% of health care workers with master's degree were aware of telehealth in comparison to 31.8% among those with a diploma, 64.3% of physicians were aware of telehealth while 9.6% of nurses were aware. The score of knowledge and attitude increased from 130 ± 23.538 to 156.49 ± 18.456 after the educational program. **Conclusion:** Half of health care workers were aware of telehealth; the orientation improved the Healthcare Workers' knowledge and attitude.

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Key Words: *Telehealth, Primary Health Centers, Health Care Workers.*

INTRODUCTION

Telehealth by definition is delivering health care services remote from health-care facilities using telecommunications and virtual technology. Telehealth is considered the most basic part of e-health, which depends on far wider range of information and communication technologies[1] . Telemedicine was first used in 1960s [2] .

The main components for implementing telehealth are: Leadership and governance, to ensure the involvement of stakeholders. Strategy and investment, by making sure that the plan meets acceptance from consumers. Legislation, policy and compliance are also essential for telehealth. Infrastructure entails providing updated equipment compatible with the required services, designing software compatible with the needs of the service, as well as proper training of health care providers to be ready to provide high quality service. Regular evaluation of the workforce, workshops and training should be provided on regular bases for continuous appraisal of the program, and to ensure its progression and evolution. Preparing management teams and proper structure definitely will assure sustainability and progress of different telehealth programs [3].

Telehealth in family practice can render promising effects in connecting, sharing and processing information and data leading to improving quality of health care delivered on personal and community basis. As well as reducing costs of health services. This can happen through initiation of a strategy for using technology in primary care settings and allow family physicians to be leading the implementation and development of technology in a manner that suits primary care services and patient centered approach [4].

Telehealth is crucial to help doctors in rural areas to access specialists' services, besides providing medical students education over distance. It is shown that the assistance of telehealth for primary care providers in continuous education and acquiring knowledge through peer communication and reducing isolation as well as tele consultation through which they could benefit from consulting specialists located in another area [5].

Telehealth is a multi- phasic system, as it serves patients and healthcare workers by providing them with the tool to help them in proper health care and give them the chance to receive training sessions and conducting research [6].

Egypt is deploying technology in all its services in different socio-economic applications. As an example of these applications are e-government, e-businesses and e-learning. Minor steps have been taken in telehealth but not yet enough [7]. Egypt is aiming to reach Universal Health Coverage; this increases the demand of telehealth in routine health services [8].

The current study aimed to measure the awareness of telehealth among workers of primary health care units and to evaluate and identify change of attitude of health care workers towards telehealth implementation after orientation.

SUBJECTS AND METHODS

Study design and setting : The study was designed to be an interventional study for Healthcare Workers (HCWs). The study was conducted in Primary Healthcare (PHC) centers in East region of Cairo, Egypt. Data collection was completed in 9 months,

Study population : The study included all the PHC workers who were present at the selected units and agreed to participate and had a role in referring and following up the patients. The selected health care

workers needed to fulfill one inclusion criteria that s/he should have spent at least 6 months in PHC units to be familiar with the work nature in such units.

Sampling method: All the present Healthcare workers who were working at the units and met the inclusion criteria and agreed to participate were recruited.

Study's procedure and data collection: Healthcare Workers questionnaire was designed after Ayatollahi and collaborators after few modifications [9] . It is an adjusted valid self-administered five-point Likert-scale questionnaire. The questionnaire included:

- 1) Personal information (eleven questions)
- 2) Healthcare Workers' knowledge of telemedicine technology (seven questions)
- 3) Healthcare Workers' perception of the advantages of telemedicine technology (seven questions)
- 4) Healthcare Workers' perception of the disadvantages of telemedicine technology (eight questions)
- 5) Necessity of deploying telemedicine technology (six questions)
- 6) Impact of the application's ease of use (six questions)
- 7) Importance of the security of telemedicine technology (Six questions).

A total of 109 questionnaires were collected in this phase from healthcare workers who were present and agreed to participate.

The scoring of questionnaire questions was done by five points, as 5 is the highest point and 1 is the lowest. A score was given for each domain then a total score was given for the whole questionnaire.

The health care workers received an Orientation program: The program included one session, which was held after filling the questionnaires. The message delivered during the orientation session covered five points to give better insight on telehealth, the following were the discussed points:

- 1) Full definition of Telehealth
- 2) Different technologies in telehealth
- 3) Application and usage of telehealth
- 4) Data storage and security
- 5) Importance of telehealth

The session was a face to face interactive talk for each participant individually. A lot of pictures were presented during the orientation program. The talk was concluded with a sum up to ensure their full comprehension.

A handout with the information mentioned in the session, that was previously prepared including written data and illustrating figures, was given out following the session for reminder and further reading.

In this phase a total of 104 questionnaires were collected, after 2 weeks of the orientation program, giving a response rate = 95.4%. The drop rate is contributed to healthcare workers were on vacation so couldn't reach them

Statistical analysis : Data was cleaned and processed using SPSS version 23. First, the following descriptive analysis was done: frequency, percentages, mean and standard deviation (SD). Thereafter, a comparison was done using Student t-test for quantitative variables and Fisher exact test for qualitative variables. Level of significance was set at p value equals to or less than 0.05. The adjusted predictive factors for awareness about telehealth were obtained using the logistic regression analysis. The dependent variable was the presence and absence of awareness about telehealth in all HCWs. All variables described previously (age in years, gender, postgraduate study and work experience in months) were considered as possible candidates for the final model. The initial multivariable model construction consisted in the preliminary selection of variables

using a manual, purposeful selection method and a relatively large significance level (approximately 0.25). Subsequently, the resulting model was reduced using a likelihood ratio test with a significance level of 0.05. Before accepting a final model, the interactions and confounding variables were evaluated.

Ethical Considerations: Informed consent was taken from every participant. The study protocol was reviewed and approved by the Institutional Review Board in Faculty of Medicine, Ain Shams University.

RESULTS

In this study, a convenient sample of Healthcare workers from primary health care centers were selected (n=109). The responders were physicians (n=42) representing 38.5% of the studied sample. The age ranged between 26 and 45 years with a mean of 31.12 ± 3.723 years and experience of 1 to 11 years.

The physicians were subdivided into five specialties where family physicians were the majority (n=24, 57.1% of the physicians) followed by pediatricians (n=8, 19.0%) and the rest were internal medicine doctors, gynecologists and family planning doctors. The nurses (n=27) represented 24.8% of the sample, of age between 20 to 34 years with a mean of 25.56 ± 3.320 and experience ranged between 2 and 11 years with, dentists (n=12), pharmacists (n= 16) and physical therapists (n=12) representing 11%, 14.7% and 11% of the sample respectively with age ranged between 23 and 34 years and experience of 1 year to 12 years duration.

In total, all the 109 HCWs completed the questionnaire in the first phase. The majority of the respondents were females (n=99, 90.8%), and 10 responders were males (9.2%). Only 31.2% of HCWs were registered for post-graduate studies, the majority registered for diploma 20.2% and 11% for masters. Inferential statistics showed that there was association between level of education and awareness of healthcare workers of telehealth, 66.7% of those with master's degree were aware of telehealth while only 31.8% of those with diploma were aware and the difference was statistically significant as $P=.038$.

In another aspect 49.1% of physicians were aware of telehealth while only 29.6% of nurses were aware of telehealth and the difference was statistically significant as $P=0.048$. At the same time there was no association between awareness and different specialties of physicians as $P=.531$. The total score was highest among physicians 141.15 ± 22.941 while it was lowest among pharmacist, 114.10 ± 22.283 and in between among other professions, the difference was statistically significant as $P=0.0004$ through ANOVA. There was no statistical significance difference between the total scores of physicians with different specialties as $P=0.707$.

Table 1 shows that the scores of different domains increased after application of the program and the mean differences are statistically significant in different domains as $P_i < 0.05$.

Table 2 shows that the difference between different groups of jobs concerning health care workers satisfaction to implement Tele-health is statistically significant as $P_i < 0.05$.

The total number of Healthcare workers was 109 HCWs, 54 (49.5%) HCWs are aware of telehealth and 55 (50.5%) HCWs are not aware of telehealth. **Table 3** shows that age and experience in months were the only adjusted predictive factors for awareness about telehealth.

DISCUSSION

This work aimed to assess the level of HCW awareness to telehealth before and after an individualized orientation session was given. The percentage of awareness among HCWs before the educational program was 50.5% which is almost similar to a study conducted in Libya as they found that the awareness was 56% [10]. This similarity may be because both studies were conducted in developing countries of similar culture and infrastructure. The result is higher than a study conducted in Iran (39%), but less than a study was conducted in Pakistan where awareness was 80.7% [9,11]. This discrepancy may be attributed to the difference in the health sector setting where the studies were conducted; the study of Ashfaq and collaborators was conducted in public hospitals while the current study was conducted in a primary health sector [11].

In the current study gender did not affect awareness. Females constituted 90.8%; 50.5% of them were aware, this was very close to the awareness amongst males (50%). This result is different from Parvin and Shahjahan study who found that the gender is associated with awareness ($p= 0.04$), and this difference may be attributed to the different health sector levels of the different studies

[12].

The association between awareness and level of education was statistically significant as $p = 0.038$, with the highest percent of awareness was recorded among master's degree HCWs (66.7%). Biruk and Abetu had similar findings as the percentage of awareness among participants with bachelor's degree was higher than among others (82.1%, $p=0.000$) [13]. It can be concluded that education plays a major role in the HCWs awareness.

The association between telehealth awareness and the professions' categories is statistically significant as $P= 0.048$. Telehealth awareness was the highest among physicians than other HCWs as they represented 49.1% of the total awareness and 64.3% of the physicians were aware of telehealth and the lowest were dentists and physical therapists both representing 9.1%. This agrees with Abodunrin and Akande as they found a significant association between profession and telehealth knowledge ($p= 0.0012$) [14]. These results could be because physicians are engaged in more post graduate courses than nurses and this allows them to be more up to date with new technologies. On the other hand, there was no relationship between the level of awareness to telehealth and the specialty of participating Physicians, with Family physicians showing the highest percentage of awareness (63.0%).

In this study Physicians and nurses ($n=69$) awareness assessment was further investigated according to the effect of the presence of corona. It was found that the percentage of physicians and nurses, aware of telehealth increased during the COVID-19 era from 30.0% before the corona pandemic to 59.2% after. This increase was statistically significant ($P= 0.036$). This result is similar to a study in Lebanon, who found that the perception of physicians towards telehealth increased from 42% to 74% after the COVID-19 era [15].

The knowledge domain mean score before and after the program was (15.94 ± 9.431 , 25.00 ± 5.841 respectively) and the difference was statistically significant as $P= 0.000$, which is the lowest pre score in comparison with other weighted mean domains scores similar to Zayapragassarazan and Kumar as they found that the participants total knowledge score (9.34 ± 4.26) which was the least of all parameters [16]. The knowledge of the participants was highly impacted by the program as it improved by more than 25% of the total score in all domains.

The domain of advantages showed a mean score 23.64 ± 5.694 before the program that rose to 28.43 ± 3.949 which is statistically significant as $P= 0.000$. The same with the disadvantages perception domain that reflected the HCWs sense of the drawbacks and negativity of telehealth technology which was mainly attributed to lack of face to face communication and technical problems, this agrees with Baig and collaborators, which could be due to the similarity in culture and norms of participants of both studies [17]. This domain scored 26.96 ± 5.734 before and 28.92 ± 5.273 after the program and the difference was statistically significant as $P= 0.004$.

The necessity domain mean score, that measures HCWs consideration to the importance of applying telehealth in the daily practice, was (21.19 ± 4.502). This constitutes of 70.6% of the total domain's score which is considered the highest weighted mean domain scores before and after (24.89 ± 3.604 , 83%) and the difference is significant ($P= 0.000$). This is similar to Baig and collaborators who found that 52.78% of the participants stated the importance of the availability of telehealth throughout Pakistan, and this similarity in both studies can be explained by the similarity in culture and infrastructure in both communities [17].

As for the use easiness perception domain recorded the second lowest minimum and weighted mean domain score after the knowledge domain as most of HCWs weren't comfortable with using technology but after application of the program and the HCWs got the opportunity to know more about telehealth, a significant rise in the scores of the domain was recorded ($P= 0.000$). This is similar to a study in Saudi Arabia, as

they found that the perception of the easiness of using telehealth recorded the lowest mean score among participants working at health sector adopting telemedicine (2.80 ± 0.643) [18]. This similarity could be due to the fact that both studies were conducted in countries of similar customs. Subsequently, this throws light on the importance of continuous orientation and training programs that are essential to increase awareness of telehealth.

The last domain of the questionnaire was assessing the security perception of the HCWs to find out their insight on the safety and privacy needed in telehealth application which was considerably high in comparison to other domains given mean scores (23.04 ± 5.353 and 25.49 ± 5.206 , $P=0.001$). This result may be due to the belief of the HCWs that more legislations and efforts need to be done to ensure protection of data and prevent breaching. This agrees with Biruk and Abetu that found that 66.0% of the participants were skeptical about the safety of Telehealth [13].

The difference between the five different professions' groups and the mean total score before the orientation program, was compared using ANOVA test which showed statistical significance as $P= 0.004$ with the highest mean for physicians (141.15 ± 22.941) and the lowest for pharmacists (114.10 ± 22.283). Post Hoc test shows a significant difference between physicians and pharmacists ($P=0.008$). On the other hand, there is no significant difference between different physicians' specialties after comparing the mean total score using ANOVA test ($p=0.707$). This result is different with Ayatollahi and collaborators as they found significant difference between clinicians' perception ($P=0.003$) [9]. This difference could be due to difference in working specialties and the experience duration of Physicians participated in the later study while in this study all Clinicians were from the same work environment (primary healthcare centers).

The experience duration was believed to be one of the predictive factors affecting the awareness of healthcare workers about telehealth, but it was statistically insignificant $P= 0.142$. Also, the correlation between the experience duration and the different domains scores and the total score of the questionnaire was statistically insignificant as $p>0.05$. This result is differed from Biruk and Abetu as they found that years of experience was associated with HCWs knowledge of telehealth ($P=0.008$) and the same in Eshita's study in Bangladesh who found that knowledge was influenced by experience as there was a statistical significant relationship between years of experience and knowledge [13,19]. The difference between the latter two studies and this study could be due to faster emergence and facilitated adoption of telehealth lead to earlier exposure of HCWs to such technology.

As regards the age of HCWs, it was found out that it is a predictive value for the awareness of telehealth with statistical significance ($OR= 1.13$, $CI= 1.006-1.270$, $P= 0.040$). This means that younger age of HCWS are more knowledgeable and aware of telehealth. Thus, it should be considered that educational programs should be targeting older age to raise their awareness of telehealth and this can be explained as younger ages are more familiar with new technology.

Regards the willingness of healthcare workers to use telehealth, they were asked about the degree of their satisfaction to implement telehealth before and after the program. The result demonstrated that most of the participants after the application of the program were strongly agreeing (37.6%) or agreeing (42.2%) to implement telehealth and the majority was represented by the physicians followed by nurses, while the majority of disagree was by the pharmacists. There was a statistical significance concerning levels of satisfaction before and after the orientation programs as well as between HCWs professions and degree of satisfaction as $P=0.000$. This is the same as in Joseph and collaborators' study as they found that 78.1% are willing to use telehealth in their practice as well as in Dey and Bhattacharya as they found that 76% are willing to use telemedicine [20,21]. So, it can be concluded that HCWs are enthusiastic to use telehealth but they only lack knowledge and experience in the field.

Finally, this study proved the successfulness of the education program by using the same questionnaire before and after delivering the session and comparing the mean score of different domains. The comparison showed that the score of different domains increased after the application of the program and the differences were statistically significant. The difference between total mean score before and after the program ($130.36 \pm$

23.538 and 156.49 ± 18.456 respectively) was statistically significant as $P= 0.000$. This shows the importance of continuous teaching and training of HCWs in order to be knowledgeable and skillful, this change in the scores besides the rise in the awareness percentage after COVID-19 emergence, reflects the eagerness of HCWs to learn and their readiness to acquire experience for new approaches that will improve the healthcare delivery.

The impact of adoption of telehealth interventional educational programs on wide base should be investigated and focused on, as it will help in disseminating the concept of telehealth among HCWs which will improve their knowledge and prepare them for the new era of technology. Telehealth is essential to achieve universal health coverage and is one of the pillars of a comprehensive health system. Therefore, it is recommended that continuous education and training, policies implementation and national guidelines are needed for sustainable application of telehealth.

REFERENCES

1. **Stroetmann KA, Kubitschke L, Robinson S, Stroetmann V, Cullen K, Mcdaid D** . How can telehealth help in the provision of integrated care. 2010. Available from: <http://www.euro.who.int/pubrequest>.
2. **Doarn CR, Pruitt S, Jacobs J, Harris Y, Bott DM, Riley W et al** . Federal efforts to define and advance telehealth - A work in progress. *Telemed e-Health*. 2014; 20(5): 409–18.
3. **Puskin DS, Sanders JH** . Telemedicine infrastructure development. *J Med Syst*. 1995;19(2):125–9.
4. **Phillips RL, Bazemore AW, Devoe JE, Weida TJ, Krist AH, Dulin MF, Biagioli FE** . A Family Medicine Health Technology Strategy for Achieving the Triple Aim for US Health Care. *Fam Med*. 2015; 47(8): 628-35.
5. **Bonney A, Knight-Billington P, Mullan J, Moscova M, Barnett S, Iverson D, Saffioti D et al** . The Telehealth Skills, Training, and Implementation Project: An Evaluation Protocol. *JMIR Res Protoc*. 2015; 4(1): e2.
6. **Rutledge CM, Kott K, Schweickert PA, Poston R, Fowler C, Haney TS** . Telehealth and eHealth in nurse practitioner training: current perspectives. *Adv Med Educ Pract* 2017; 8: 399-409.
7. **Hussein R, Khalifa A** . Telemedicine in Egypt: SWOT analysis and future trends. *Med Inform Biom Epidemiol*. 2012; 8(1).
8. **Al-Shorbaji N, Househ M, Taweel A, Alanizi A, Mohammed BO, Abaza H et al** . Middle East and North African Health Informatics Association (MENAHA): Building Sustainable Collaboration. *Yearb Med Inform*. 2018; 27(1): 286–91.
9. **Ayatollahi A, Sarabi FZP, Langarizadeh M** . Clinicians' Knowledge and Perception of Telemedicine Technology. *Perspect Health Inf Manag* 2015; 12 (Fall): 1 C.
10. **Elhadi M, Elhadi A, Bouhuwaish A, Bin Alshiteewi F, Elmabrouk A, Alsuyihili A et al**. Telemedicine awareness, knowledge, attitude and skills of healthcare workers in a low resource country during the COVID-19 pandemic (Preprint). *J. Med. Internet Res*. 2020: 20812.
11. **Ashfaq A, Memon SF, Zehra A, Barry S, Jawed H, Akhtar M et al**. Knowledge and Attitude Regarding Telemedicine Among Doctors in Karachi. *Cureus* 2020; 12(2): e6927.
12. **Parvin R, Shahjahan M**. Knowledge, Attitude, and Practice of E-Health Among Doctors Working at Selected Private Hospitals in Dhaka, Bangladesh. *J. It. Soc. Telemed eHealth*. 2016; 4: e15.
13. **Biruk K, Abetu E**. Knowledge and Attitude of Health Professionals toward Telemedicine in Resource-Limited Settings: A Cross-Sectional Study in North West Ethiopia. *J. Healthc. Eng*. 2018; 2018: 2389268.

14. **Abodunrin OL, Akande TM.** Knowledge and Perception of e-Health and Telemedicine among Health Professionals in LAUTECH Teaching Hospital, Osogbo, Nigeria. *Int. J. Health Res.* 2009; 2(1): 51-8.
15. **Helou S, EL Helou E, Abou-Khalil V, Wakim J, El Helou J, Daher A, El Hachem C.** The Effect of the COVID-19 Pandemic on Physicians' Use and Perception of Telehealth: The Case of Lebanon. *Int. J. Environ Res Public health.* 2020; 17(13): 4866.
16. **Zayapragassarazan Z, Kumar S.** Awareness, Knowledge, Attitude and Skills of Telemedicine among Health Professional Faculty Working in Teaching Hospitals. *J Clin Diagn Res.* 2016; 10(3): JC01-4.
17. **Baig MM, Khaliq T, Safdar CA.** Perceptions of post-graduate medical students, regarding effectiveness of telemedicine (tm) as an instructional tool. *Pak Armed Forces Med J.* 2014; 64(4): 614-9.
18. **El-Mahalli AA, El-Khafif SH, Al-Qahtani MF .** Successes and Challenges in the Implementation and Application of Telemedicine in the Eastern Province of Saudi Arabia. *Perspect Health Inf Manag.* 2012; 9(Fall): 1-27.
19. **Eshita IR.** Knowledge and Attitude of the Physicians Toward Telemedicine. 2017; 5(12): 85-146.
20. **Joseph LAS, Olamide AA, Mathew CI, Oluwole AO, Oladapo AA, Ashiru OA.** Knowledge and perception of health workers towards tele-medicine application in a new teaching hospital in Lagos. *Sci Res Essays.* 2007; 2(1): 16-9.
21. **Dey I, Bhattacharya S.** Knowledge and Perception of Telemedicine among Post Graduate Students of a Tertiary Hospital of West Bengal. *IOSR-JDMS.* 2016; 15(6): 8-11.

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