Information and Communication Technologies (ICT) in primary Health Care facilities in Egypt

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**Introduction:**

The health sector has always relied on technologies. According to **World Health Organization (WHO) (2004)**, they form the backbone of the services to prevent, diagnose, and treat illness and disease. ICTs are only one category of the vast array of technologies that may be of use. Given the right policies, organization, resources, and institutions, ICTs can be powerful tools in the hands of those working to improve health (**Daly, 2003).** Health information technology (HIT) is in general increasingly viewed as the most promising tool for improving the overall quality, safety and efficiency of the health delivery system (**Chaudhry et al., 2006)**.

ICTs are defined as tools that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means. Health information technologies include the application of health information systems (HIS) designed primarily to support the management of patient's records such as Electronic Health Record (EHR) system, and to assist medical and health care delivery such as clinical decision support system (CDSS) and computerized provider order entry (CPOE) system (**Aziz et al., 2009)**.

**Objectives:** was to assess the current situation of Information and Communication Technologies in primary health care and to recognize the areas of strengths and weakness in ICT application in the primary health care.

**Subjects and methods:**

Study design: Crosses sectional study

Study setting: Family medicine departments in Menofiya University and Cairo University.

Sample size: All family medicine postgraduate students including the first and second parts in family medicine departments in Menofiya University and Cairo University in addition to demonstrators and assistant lecturers in both departments in the academic year 2013/2014 were invited to participate in the study.

Tools:

A semi structured interviewing questionnaire consisted of two parts. First part includes the socio-demographic characteristics e.g.: age, sex, educational level, years of experience ….etc. Second part contains information's about ICT in Primary care services at the work place e.g.: availability of ICT in the current work place, its type, previous training on ICT and site of training, variety of ICT utilization in the work place…etc. Third part covers the practice of ICT’s in Primary Care through six questions. It covers the using of ICT in word processing, Medical Records handling, E- mailing, Health education message, research and management plan with yes or no answer. A score of ≥ 4out of 6 is considered a good practice while a score of less than 4 is considered a poor practice.

A qualitative descriptive approach was taken using focus groups as the data collection method. Focus groups were chosen due to their ability to elicit unique perspectives on the study subject, originating from interactions between participants within *each* group. It was done with 35 participants. Four focused groups discussions were conducted (n1,2=8, n3=9, n4=10). Each session lasted 60 minutes' had a moderator, observer and was reordered. Guiding questions were used to collect data. Statistical program SPSS v. 15.0 (SPSS Inc., Chicago, Il, USA) was used Continuous data were presented as means ± standard deviations and range. Percentages were calculated for dichotomous variables. Group comparisons were performed by Pearson’s Chi squared test, or the Mann-Whitney *U* test, as appropriate.

**Results:**

The aim of this study was to gain a better understanding of the current situation of Information and Communication Technologies in primary health care for health promotion and factors affecting such communication in a PHC setting. The study revealed that about half of the 172 physicians working in primary care settings and participated in the study (51.2%) had an ICT available in their work places.

Table (1) showed that the mean age of the participated physicians was 32.8± 5.6SD, with mean years of experience of 4±2.1SD and around two third of them (58.1%) were females. The highest percentage of them were GPs (93.0%), working in rural areas (65.1%) that is governmental health center (51.2%), holding family medicine diplomas (55.8%) and had ≤5 years of experience (74.4%).

From table (2); it is noteworthy that all physicians who had an available ICT at their workplaces mentioned that they had a training experience on ICT representing (51.2%) for both of them, and one fourth of them received their training in the MOHP (25.0%). Also, the table shows that the most available type of ICT was computers (29.2%) and Fax was the least available type present in only (4.0%) of studied workplaces. Computers were mostly used for evidence based treatment (72.7%), followed by research (42.0%), while the least utilization for ICT was for dissemination of information (13.6%).

Table (3) shows that there is a highly significant relation (with P value < 0.05) between the practice score of the studied group and their qualifications, years of experience and the availability of electronic connections at their workplaces, P values (0.008,0.000,0.000) respectively.

Table (4) notes that; the differences between those who received training on ICT and who don’t is significant for the years of experience, availability of ICT and their electronic connections detected by P values of (0.007, 0.000 & 0.04) respectively.

It also shows that, utilization of ICT by the studied group for producing data bases to be used by decision makers, participating in any activities using ICT, medical Records handling, health education, research and in management plans were statically significant for the trained group in comparison to those who were not trained.

From tables (5&6); it was found that practice scores has positive correlations with years of experience confirming the previous results showed in table (3), in addition to the utilization of ICT in health education and research; denoting the importance of using ICT for these two domains in order to achieve better practice scores in primary care settings.

The results of the qualitative data from the Focus group discussions done with 35 physicians revealed that; the majority of them mentioned that the budget allocated for ICT utilization in workplaces in not enough (97.1%). Also, stable electronic supply for ICT units and incentives for ICT users as well as maintenance for ICT equipments should be available as mentioned by most of them (88.5%).

Around three quarters of participated physicians (74.2) mentioned that there is no connectivity to another network was present at their workplaces and (85.7%) of them agreed that there was no maintenance for the ICT equipments at their workplaces.

It is noteworthy that; more than half of the physicians who attended the focus group discussions reported that no activities for preparation of FP human resources for ICT utilization and policymakers had poor commitment towards ICT utilization in FP (68.5% & 57.1%) respectively.

**Discussion:**

According to Kreps, 2010 understanding the context is central to planning of health communication interventions, especially within the health care services, where a myriad of individual, organizational and societal factors influence health related decisions and practice.

Despite a low level of ICT availability in workplaces of the studied group, where only half of them (51.2%) mentioned having ICT and being trained on it, (88.5%) of them indicated the importance of the use of ICT in primary care and stated that incentives should be given to ICT users. This percentage is higher than what was mentioned in one Poland study done by (B Pędziński et al., 2013) where (67%) of surveyed GPs believed that the use of software and IT systems improves the quality of healthcare services. Those result were also similar to the European survey on Benchmarking ICT use in 2008 (Dobrev et al., 2008), which showed that, regardless of the degree of implementation of ICT in the country, most physicians see opportunities to use IT systems to improve the quality of services.

In some studies where the attitudes towards ICT use were analysed, the results have shown that physicians who were using the ICT system were more convinced of the positive effects than those who had never worked with it (Jha, DesRoches et al.,2009; Leung et al., 2003; Morin et al., 2005; Sequist et al., 2007). Findings from this study goes hand in hand with the above mentioned studies; where physicians who received training on ICT had a significant difference in using it that those who did not receive training before.

This difference was obvious in relation to their practice score, where good scores were achieved with highly statistically significant difference (P=0.000) in primary care facilities with electronic connections. The same pattern was followed when comparing trained studied physician on ICT with non- trained one, where high statistically significant difference was found between the two groups in areas of handling medical records, producing data base and practicing activities using ICT.

The study highlighted that physicians trained on ICT are using it in HE, research and in management plans with a high statistically significant difference than those who are not using it. This could partly explain the above mentioned results of good practice scores among ICT users than non-users in this study.

In the 2008 Benchmarking ICT study (Dobrev et al., 2008; European Commission Information Society and Media Directorate General, 2007), the most important facilitating factors in Europe and in Poland were as follows: the need for e-health inclusion in medical education, the need for more IT training and a better networking of all healthcare in order to share clinical information.

These results are in line with what was found in this study where the above finding emphasizes the importance of providing training on ICT on using it, as all trained studied physicians agreed on using it in their workplaces. Also, among the 35 physicians who attended the focus group discussions three quarters of them (74.2%) stated the importance of having connectivity to other networks for sharing information.

However, when it comes to the potential barriers, lack of budget allocation for ICT in primary care setting was the greatest reported barrier mentioned by (97.1%), followed by incentives and maintenance. This is in accordance with Poland in 2008, where cost was a decisive factor concerning ICT use and was seen as more important than lack of ICT maintenance support (Dobrev et al., 2008).

The four most common barriers to ICT implementation in this study were lack of fund, providing incentives to ICT users, availability of stable electric supply and maintenance of equipments. The lack of funds as a major barrier to adoption of ICT has been shown in several other studies, particularly in the US (DesRoches et al., 2013; Gans et al., 2005; Jha, DesRoches et al., 2009; Miller et al., 2004).

**Conclusions**

Lack of funds, risk of instability of the electric supply and lack of incentives for ICT users were the most common barriers to ICT implementation. Statistically significant differences between ICT trained and non-trained groups shows the importance of providing training for physicians in primary care facilities in order to improve their practices and the usage of ICT as all trained physicians did use ICT in their workplaces.

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**Table (1): General characteristics of studied group:**

|  |  |  |
| --- | --- | --- |
| Parameter | No(172) | % |
| **Age :**  Mean ± Std. Deviation  Range | 32.8±5.6  20(24-44) | |
| **Sex:** Male  Female | 72  100 | 41.9  58.1 |
| **Qualification**  General practitioner(M.B.B.CH)  Family Medicine Board degree  Family Medicine Diploma  Family Medicine Master | 42  20  70  40 | 24.4  11.6  55.8  32.6 |
| **Years of experience in family practice**   * Less than or equal 5 * More than 5   Mean ±SD  Range | 128  44 | 74.4  25.6 |
| 4±2.1  7(1-8) | |
| **Site of work**  Rural primary health care  Urban primary health care | 112  60 | 65.1  34.9 |
| **Type of health service:**  governmental unit  Governmental center | 84  88 | 48.8  51.2 |
| **Administrative job description**  General Practitioner  General Director  Family physician | 42  32  98 | 93.0  4.7  2.3 |
| **Total** | 172 | 100.0 |

**Table (2): Current situation of ICT:**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **No(172)** | **%** |
| **Availability of ICT:**   * Not available * 1Per one personnel * 1 Per 3 personnel | 84  51  37 | 48.8  29.7  21.5 |
| **Type of ICT:**   * Not present * Computers * Mobile phones and computers * Electronic Medical records and computers * Fax | 84  50  19  12  7 | 48.8  29.2  11  7  4 |
| **Previous training experience on ICT**   * No * Yes | 84  88 | 48.8  51.2 |
| **Site of training experience (n=88):**   * MOHP * Local university * Others\* | 43  25  20 | 25.0  14.5  11.6 |
| **Utilization of ICT at workplace :**   * Not used * Used | 84  88 | 48.8  51.2 |
| **Way of Utilization of ICT at workplace (n=88) :**   * Dissemination of information * Database used by decision makers * Research * Treatment (evidence based treatment) | 12  32  37  64 | 13.6  36.7  42.0  72.7 |
| **Number of FP personnel apply for ICT training last year at workplace**:   * 0 * 1-3 * ˃3 | 108  36  28 | 62.8  20.9  16.3 |
| **Total** | 172 | 100 |

\*others; private company, international university …etc.

**Table (3): Relation between practice score and general characteristics of the studied group:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Practice score | | | | Total | % | X2 | P value |
| Poor  (109) | % | Good  (63) | % |
| **Qualification**   * General practitioner(M.B.B.CH) * Board degree * Diploma * Master | 26  18  36  29 | 61.9  90  51.4  72.5 | 16  2  34  11 | 38.1  10  48.6  27.5 | 42  20  70  40 | 24.4  11.6  40.7  23.3 | 11.9 | **0.008\*** |
| **Site of work:**   * Rural * Urban | 96  40 | 61.6  66.7 | 43  20 | 38.4  33.3 | 112  60 | 65.1  34.9 | 0.4 | 0.3 |
| **Years of experience:**   * Less than or equal 5 * More than 5 | 97  12 | 75.8  27.3 | 31  32 | 24.2  72.7 | 128  44 | 74.4  25.6 | 33.2 | **0.000\*** |
| **Previous training on ICT**   * No * Yes | 48  61 | 57.1  69.3 | 36  27 | 42.9  30.7 | 84  88 | 48.8  51.2 | 2.7 | 0.07 |
| **Site of training:**   * MOHP * Local university * Others | 32  15  14 | 74.4  60.0  70.0 | 11  10  6 | 25.6  40.0  30.0 | 43  25  20 | 48.9  28.4  22.7 | 1.6 | 0.5 |
| **Availability of ICT:**   * Not available * 1Per one personnel * 1 Per 3 personnel | 51  34  24 | 60.7  66.7  64.9 | 33  17  13 | 39.3  33.3  35.1 | 84  51  37 | 48.8  29.7  21.5 | 0.5 | 0.8 |
| **Electronic connection:**   * Not present * Computers * Mobile phones and computers * Electronic Medical records and computers * Fax | 71  22  9  4  3 | 84.5  44.0  47.4  33.3  42.9 | 13  28  10  8  4 | 15.5  56.0  52.6  66.7  57.1 | 84  50  19  12  7 | 48.8  29  11  7  4 | 32.3 | **0.000\*** |
| **Dissemination of information:**   * No * Yes | 102  7 | 63.8  58.3 | 58  5 | 36.2  41.7 | 160  12 | 93  7 | 0.1 | 0.5 |
| **Maintenance of ICT:**   * Regular * Not regular | 102  7 | 63.8  58.3 | 58  5 | 36.2  41.7 | 160  12 | 93  7 | 0.1 | 0.5 |

**Table (4): Effect of training on utilization of ICT:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Training | | | | Total | % | X2 | P value |
| No  (84) | % | Yes  (88) | % |
| **Years of experience:**   * Less than 3 * 3-5 * More than 5 | 56  19  9 | 56.6  50.0  25.7 | 43  19  26 | 43.4  50.0  74.3 | 99  38  35 | 57.6  22.1  20.3 | 9.9 | **0.007\*** |
| **Availability of ICT:**   * Not available * 1Per one personnel * 1 Per 3 personnel | 60  14  10 | 71.4  27.5  27.0 | 24  37  27 | 28.6  72.5  73.0 | 84  51  37 | 48.8  29.7  21.5 | 33.5 | **0.000\*** |
| **Electronic connection:**   * Not present * Computers * Mobile phones and computers * Electronic Medical records and computers * Fax | 51  19  7  5  2 | 60.7  38.0  36.8  41.7  28.6 | 33  31  12  7  5 | 37.5  62.0  63.2  58.3  71.4 | 84  50  19  12  7 | 48.8  29  11  7  4 | 9.6 | **0.04\*** |
| **Utilization of ICT in dissemination of information:**   * + - No     - Yes | 80  4 | 50.0  33.3 | 80  8 | 50.0  66.7 | 160  12 | 93.0  7.0 | 1.2 | 0.3 |
| **Use produced database by decision makers:**   * + - No     - Yes | 84  0 | 60.0  0.0 | 56  32 | 40.0  100.0 | 140  32 | 81.4  18.6 | 37.5 | **0.000\*** |
| **practice in any activities using ICT:**   * + - No     - Yes | 81  3 | 57.9  9.4 | 59  29 | 42.1  90.6 | 140  32 | 81.4  18.6 | 24.5 | **0.000\*** |
| **ICT utilization in word processing:**   * + - No     - Yes | 55  29 | 50.9  45.3 | 53  35 | 49.1  54.7 | 108  64 | 62.8  37.2 | 0.5 | 0.3 |
| **ICT utilization in medical Records handling:**   * + - No     - Yes | 51  33 | 56.0  40.7 | 40  48 | 44.0  59.3 | 91  81 | 52.9  47.1 | 4.1 | **0.03\*** |
| **ICT utilization in E-mailing:**   * + - No     - Yes | 40  44 | 48.2  49.4 | 43  45 | 51.8  50.6 | 83  89 | 48.3  51.7 | 0.03 | 0.5 |
| **Health education:**   * + - No     - Yes | 42  42 | 41.6  59.2 | 59  29 | 58.4  40.8 | 101  71 | 58.7  41.3 | 5.2 | **0.02\*** |
| **ICT utilization in research:**   * No * Yes | 74  10 | 54.8  27.0 | 61  27 | 45.2  73.0 | 135  37 | 78.5  21.5 | 8.9 | **0.002\*** |
| **ICT utilization in In management plans:**   * No * Yes | 59  25 | 54.6  39.1 | 49  39 | 45.4  60.9 | 108  64 | 62.8  37.2 | 3.9 | **0.03\*** |

**Table (5): correlation between practice score and general criteria of the participants**:

|  |  |  |
| --- | --- | --- |
| Variable | r | P value |
| Age | 0.07 | 0.4 |
| Sex | -0.1 | 0.07 |
| Qualification | 0.03 | 0.7 |
| Site of work | -0.05 | 0.5 |
| Years of experience | 0.5 | **0.000\*** |
| Training | -0.1 | 0.09 |
| Site of training | -0.1 | 0.2 |

**Table (6): correlation between practice score and utilization of ICT:**

|  |  |  |
| --- | --- | --- |
| Variable | r | P value |
| **Utilization of ICT in dissemination of information** | 0.03 | 0.7 |
| **Use produced database by decision makers:** | -0.08 | 0.3 |
| **practice in any activities using ICT** | -0.1 | 0.1 |
| **Health education** | 0.6 | **0.000\*** |
| **in research** | 0.6 | **0.000\*** |

**Table (7): Barriers and challenges of ICT utilization**

|  |  |  |
| --- | --- | --- |
| **Theme** | **No(35)** | **%** |
| Poor commitment of policymaker towards ICT utilization in FP | 20 | 57.1 |
| Budget Allocated for ICT utilization in workplace isn’t enough | 34 | 97.1 |
| No activities for Preparation of FP human resources for ICT utilization | 24 | 68.5 |
| There is no incentives for ICT users than non-user at workplace | 31 | 88.5 |
| There is no Connectivity to another network | 26 | 74.2 |
| Irregular or no ICT equipment maintenance at workplace | 30 | 85.7 |
| No Presence of permanent stable electric supply for ICT unit in case of cut off electric supply | 31 | 88.5 |