(RESEARCH ARTICLE)

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Contribution of the smartphone in medical practice

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Abstract

Purpose to determine the place of the smartphone by evaluating the possession and the use of medical applications in the practice of the professionals at the Mohamed VI University Hospital of Marrakech and hospital "Moulay Youssef Rabat"

This is a prospective descriptive and mono-centric analytical study on health professionals working or performing their training at hospital structures during the 6 months of the study using a smartphone. Our study took place over a period of 6 months, from August 1, 2018 to January 31, 2019, is carried out on two sites.

- Within the Moulay Youssef Hospital Rabat CHR,
- Hospital mother and child Mohamed VI Hospital Marrakech hospital.

A clear predominance of female 131 (65%) , with a sex ratio F / H of 0.51.with an average age of 34.4 years, with extreme ages between 60 and 18 years.

We found that 149 (74.5%) were hospital professionals, 86 (43%) were medical students, 191 (95.57%) used French as their main language. - 142 (71%) use a smartphone and 125 (62.5%) use it in the medical prescription. Of the 200 professionals, 81% were convinced of the benefit of using Smartphones.

The overflow of professional boundaries was highlighted as a disadvantage by 47% of the professionals.130 (65%) want more APPS communications and more than 50% were willing to pay between 50 and 200 MAD for medical APPS.

In our study There is a statistically significant linear correlation between the age and the number of smartphone users during these 6 months (p = 0.023).There is a statistically significant linear correlation between professional status and number of smartphone uses during these 6months (p <0.001).

Our study joins the data of the literature with an average of the number of use during these 6 months which is not statistically different according to the sex (p = 0.27). There is a statistically significant linear correlation between the average number of smartphone uses for medical purposes and the number of Smartphone usage during these 6 months (p <0.001).

In our study, the average number of uses during these 6months is statistically different depending on the professionals we judge that it is beneficial (p = <0.01).

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The smartphone is a real tool in the practice of health professionals for optimal care of the patient. It would be interesting to develop formal assessment strategies and training in these medical applications for use with confidence in our context.

Keywords: Application; Smartphone; Medical practice; Morocco; professional

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1. Introduction

We live in an era full of technological innovations that are becoming more and more efficient. The Smartphone, a democratized object, has become a working tool in many professions including the medical professions.

These privileged interfaces of e-health, are part of our daily life and evolve our professional practice and our relationship with patients. It is a means of communication that opens up new possibilities for organizing the care system.

Few studies have been conducted on the type of medical applications used, frequency of use, satisfaction and confidence in these applications. None, to my knowledge, has been carried out within the Faculty of Medicine and Pharmacy of Marrakech.

My work will therefore focus on evaluating the use of Smartphone medical applications by healthcare professionals, their frequency of use, the benefits and limitations of their use, and the development needs of these applications. The target population is the practitioners of hospital Rabat and University hospital Marrakech.

Indeed, several questions arise about the use of the Smartphone in medical practice:

- What are the advantages and disadvantages of using the smartphone in medical practice?
- What types of applications are most used and from what perspective?
- Is there a feature related to the use of the smartphone in the middle Hospitable?
- Is there a difference between Smartphone use at the university level (CHU) and at the public health level (CHR)?
- Is there knowledge of ethical and legislative issues related to the use of the smartphone in medical practice?

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2. Material and methods

2.1. Materials

2.1.1. The type of study

This is a descriptive and bi-center analytical prospective study.

2.1.2. The study environment

Our study is carried out in two sites:

- Moulay Youssef Rabat regional hospital center.
- Mother and child hospital CHU Mohamed VI Marrakech.

2.1.3. The study period

Our study took place over a period of 6 months, from August 1, 2018 to January 31, 2019.

2.1.4. The study sample

Type of sampling

The two-phase type of sampling was used in this study.

The inclusion criteria

Health professionals working or doing their internships in hospital structures, during the 6 months of the study using a smartphone.

The exclusion criteria

We have excluded anyone who is not a healthcare professional and any healthcare professional who does not use a smartphone.

2.2. Methods

2.2.1. The data carrier

The data was collected from:

- Operations sheets completed within the structure concerned (Annex 01).
- Google form exploitation sheets filled out via the internet.

2.2.2. The variables studied

We mainly studied the following parameters:

- Data linked to the profile of Smartphone users.
- Data related to the use of smartphone applications.
- Data related to users' expectations for Smartphone applications.

2.2.3. Statistical analysis

We integrated the data of the collected variables into the SPSS V.23 software.
The statistical analysis was done by this same software.
The value of <p> was calculated by the Mann Whitney-Wilcoxon test for quantitative variables and by Fischer's exact test for qualitative variables.

2.2.4. The limits of the study

During our study, we encountered certain limitations, namely:

- Contradictory answers at the level of exploitation sheets.
- Vague and imprecise data by health personnel.

2.2.5. The ethical aspect

The data was collected taking into consideration the global ethical rules relating to respect for confidentiality and data protection specific to the subjects of the study.

2.2.6. Research methods

We searched MEDLINE, Pub Med, Science Direct, and Research Gate articles on the use of smartphones in medical practice from 1990 to 2017 using the following keywords:

- Smartphone,
- E-health,
- M-health,
- Telemedicine,
- Medical applications,
- General practitioners and smartphones,
- Specialist doctors and smartphones,
- Students and Smartphones

3. Results

3.1. Age in our series

In our study the average age was 34.47 years, with age extremes between 60 years and 18 years.

3.2. The sex in our series

In our series 65% of health professionals were female, or 131 people, and 34% of cases are male, or 69 people. That is to say a sex ratio of 0.52.

3.3. Professional status

In our study 86 professionals were either medical students (43%), 29 were either residents (14.5%), 33 were general practitioners or (16.5%), 18 were medical specialists or (9%), 19 were nurses (9.5%), 15 were student nurses (7.5%).

3.4. The language used in the smartphone applications

In our study, 191 professionals used French or 95.5%, 154 professionals used Arabic or 77%, 93 professionals used English or 46.5%, 35 professionals used Tamazigh or 17.5%.

3.5. The types of applications used

In our study 117 professionals used APPS for medical advice i.e. 58.5%, 84 professionals used APPS for medical referrals i.e. 42%, 72 professionals used APPS for medical calculation i.e. 36%, 57 professionals used APPS for medical research. literature ie 28.5%, 158 professionals used APPS for communication ie 79%, 93 of professionals used APPS for medical training ie 46.5%.

3.6. The frequency of use of the Smartphone

- In our study 142 professionals used the Smartphone in medical practice, ie 71%.
- The daily frequency during these 6 months varies from a minimum use to more than 100 uses as a maximum, with a daily average of 16 uses.
- The duration of use varies from a few seconds as a minimum duration to several hours as a maximum and an average of 11 minutes per day.

In our series, the average duration of each use of the Smartphone ranged from less than a minute to more than ten minutes.

The start of use ranges from one year to 8 years, and the average smartphone use during these 6 months of the study ranged from extremes of less than one use to 6,000 uses.

The frequency of daily medical use varied from less than one use to 300 uses.

3.7. The purpose of using the Smartphone

In our study, 125 professionals had medical prescription as their objective, i.e. 62.5%, 104 professionals used the Smartphone for reading biological assessments, i.e. 52%, 92 used it for reading radiological assessments, i.e. 46%, 80 used it. to assess the condition of patients at home either 40%, 87 used it to contact a senior or 40%, 117 used it for medical decision-making or 58.5%, 116 used it to contact colleagues or 58%, 107 used it to participate in workshops or 53.5%, 117 used it to participate in focus groups or 58.5%.

3.8. The cost to pay

In our study, 127 professionals were ready to pay for APPS, i.e. 63% of professionals, with varying values between 500 DH as a maximum and 10 DH as a minimum with an average of 143.74 DH and 73 staff preferred that the APPS be free.

4. Discussion

4.1. Advantages

Perfect ergonomics are ensured for mobile applications compared to mobile sites, which encourages users to remain loyal to the apps. Indeed, the development of mobile applications takes into account the size of the smartphone, the loading time and other parameters.

Mobile applications promote the integration of phone options and thus the user experience becomes more developed.

You don't need to have internet access for the app to work.

Easy to find on stores compared to mobile sites, mobile applications have thus experienced more widespread use among young people, especially as they notify about current events.

4.2. Disadvantages

Submission to the standards and rules published by the companies of the mobile platforms, namely Apple, Google, Windows and others.

A heavy investment for the development of a mobile application adapted to each mobile operating system, as opposed to the cost of developing a mobile site.

Whenever a mobile application is updated, the mobile user is obliged to do so through the store while the mobile site updates automatically.

In our series 174 professionals say they have a Smartphone capable of installing applications, or 87%, 22 are not able to install applications, or 11%, and 4 professionals are unable to respond, or 2%.

In our series, the majority of healthcare professionals had a smartphone capable of installing applications.

The operating systems used by staff were divided between iPhone OS used by 74 staff, i.e. 37%, 91 staff use the Android OS, i.e. 45.5%, 33 use Windows mobile OS, i.e. 16.5%, and 2 the system. Symbian is 1%.

In our series the most popular smartphone operating system was the android os followed by the iPhone os.

4.3. State of play in Morocco

There is no study from a specific scientific or governmental body that provides an idea of the integration of the Smartphone in medical practice.

4.4. Rationale for the study

The literature on a world scale and on a Moroccan scale on the subject of smartphone medical applications shows the important place of this tool in medicine. We propose in this thesis to enrich this inventory of the use of medical smartphone applications and thus to optimize the choice of doctors on these new technologies.

The Smartphone makes it possible to have a panel of medical applications which can be useful in the exercise of the health professional who has few means in his care of the patient, especially in home visit. In this situation, this tool can legitimately find its place in order to meet various needs: diagnostic tools, evaluation score, treatment management (treatment, drug interactions).

From these studies, the overall incidence of foreclosures is approximately 3.2 to 15.5 per 1,000 staff. Among students, estimates vary considerably, but they are about 10 times more frequent than among nurses, specialists and general practitioners [1].

In our series, 14.2 per 1000 of all staff during the study period used a smartphone at least once, which matches the data in the literature.

In our study, there is a statistically significant linear correlation between the average number of smartphone uses for medical purposes and the number of smartphone uses during these 6 months (p <0.001).

4.5. The benefit of using the Smartphone in medical practice

In our study, half of physicians believe they reduce prescribing errors. We know that this risk exists, this new tool could reduce it according to the literature review by Ammenwerth et al in 2008 [2].

The interest of using the Smartphone in an emergency situation is underlined by 1/3 of the doctors in our study and also in that of Haute Corse [3], with reference to the study by Flannigan et al in 2011 [2]. It shows that 28.6% of doctors correctly prescribe catecholamines in an emergency with a paper therapeutic guide compared to 100% with a medical application on a smartphone (p <0.001). [4]. Moreover, in the literature review by Lindquist et al, in 2008 [5], health professionals and students prefer to use the PDA than the paper medium. In a recent 2019 study from the GENEVA pediatric reception and emergency service showed that the use of smartphone applications reduced the risk of prescription errors from 75% to 7% with a saving of time during 50% drug preparations and administrations [6].

A little over a third of the professionals in our study think that they allow them to be more aware of the latest recommendations and scientific advances, in fact the applications are regularly updated, like that of Vidal.

In the study by Mickan et al [7] the use of the Smartphone increased the rate of electronic prescriptions from 52% to 64% (p = 0.03), errors in medical records were reduced from 22% to 8% (p <0.05), the prescription error rate was reduced from 0.45 to 0.23 (p <0.05), there was also a reduction in patient hospitalization to 1 day instead of 7.2 to 6.2 average days of hospitalization (p = 0.02).

Another major reason for using apps is to save time. A doctor in one of the open answers specifies that this time is more devoted to the relationship with the patient.

A code of medical ethics adapted to Morocco remains a project since 1953 and until now, the provisions of the current code fit into the framework of the international code of medical ethics and in the spirit of the oath of Geneva [8].

The need to codify timely medical acts for modern, humane and honest medicine obliges us to develop our own code of ethics.

In our study, most professionals have confidence in the reliability of scientific data from medical applications, while in Morocco as in France, they are not verified by any government health authority.

In England, such measures have been taken by the NHS (National Health Service) [9], in fact medical applications are subject to a selection and evaluation procedure to ensure their medical relevance and their compliance with the law on the protection of personal data.

In the United States, it is the role of the FDA (Food and Drug Administration), which controls that medical applications meet a certain number of well-defined criteria in order to be able to benefit from the trust label [10].

5. Conclusion

This work highlights the considerable contribution of the Smartphone in medical practice, either in terms of medical practice at the bedside or in the training and learning of students.

The Smartphone is destined to become essential in the kit of the general practitioner. They are in fact already 64% to use medical applications in their practice.

The most widely used categories of medical applications are drug databases and more particularly Vidal used by 45.3% of general practitioners, which would reduce their prescription errors.

This study shows that doctors are in favor of the development of these medical applications, especially those centered on the diagnostic and therapeutic management of the patient. A formal rating system would increase confidence in these new tools.

The use of the patient management software on smartphones is still exceptional. However, our study shows that doctors would like this type of application to develop. In the near future, we are thinking of creating an application that would allow better coordination of care and adaptation to our context.

Compliance with ethical standards

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Disclosure of conflict of interest

None.

Statement of informed consent

 Informed consent was obtained from all individual participants included in the study.

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