

# Exploring PDA Usage by Iranian Residents and Interns: A Qualitative Study

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## Abstract

**Background and Objectives:** Clinicians in many countries increasingly use Personal Digital Assistant (PDA) as an assisting tool in clinical practice. The pattern of PDA usage by clinicians in Iran has not been characterized. This study explored the attitudes of Iranian residents and interns toward medical uses of PDA.

**Methods:** An interview-based qualitative study was carried out in 2011. A purposive sampling method was adopted. Interviews were conducted with 11 interns and 10 residents at two teaching hospitals affiliated to Tehran University of Medical Sciences (TUMS). Data was collected using semi-structured questions. Constant Comparative Analysis was used for data analysis.

**Findings:** All surveyed clinicians used the PDA in medical applications. Usage themes were decision support resources (95%), drug references (76%), electronic books (72%), web browsing (48%), medical dictionaries (38%), anatomy and medical atlases (33%), and laboratory applications (19%). UpToDate® was by far the premier decision support resource used by subjects. iPharm® and Lexi-drugs® were the most-referred-to pharmaceutical guides. Google was the only search engine for online information retrieval. Clinicians expressed their highest satisfaction with decision support resources and e-books.

**Conclusions:** Within its limitations, this study indicated that the most frequent medical usages of PDA are those more directly associated with patient care (decision support resources and drug references). This finding encourages further large-scale studies to examine whether a similar practice pattern is prevalent among Iranian clinicians and to which extent it influences patient outcome. If a high prevalence and high impact is revealed, the barriers to PDA use by clinicians should be identified and overcome.

**Keywords:** Handheld Devices, Personal Digital Assistants, Hospital, Information Retrieval, Intern, Resident, Clinician, Clinical Practices

## Background and Objectives

There is an increasing trend in the use of handheld computers by healthcare professionals [1, 2]. Use of handheld devices such as Personal Digital Assistant (PDA) and smartphones facilitate access to updated clinical information anywhere and anytime. Combined advantages of portability, high data storage capacity, and easy data management, besides availability of medical resources such as decision support systems, pharmaceutical guides, reference texts, medical calculators, and specialty medical software, make handheld devices effective assistants during medical education and practice. A growing number

of studies report positive perception of clinicians of different specialties and grades on application of handheld devices in clinical practice [3]. Accessing information at the point of care or point of need helps healthcare professionals improve learning experiences that would ultimately lead to better clinical decision making [4]. In addition, evidence of the positive impact of PDA clinical usage on patient safety and outcome is accumulating [5].

While Iran has a relatively large electronics market, the cost of handheld computers is not readily affordable by average citizens. A previous study indicated that although physicians prefer PDAs for accessing medical information resources compared with other methods, PDA take-up is limited primarily by cost, and then by scant availability of PDA-based medical software [6]. The increasing evidence on the positive impact of PDA use on patient care encourages the

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idea of facilitating clinician access to these devices as a part of a comprehensive healthcare improvement strategy. However, gaining sufficient rationale for such a plan is dependent on a description of the extent to which PDA-owning clinicians use these devices in clinical practice. To date, no survey on the nature of PDA use by clinicians has been reported from Iran. To help narrow this gap, this study explored the usage pattern of handheld devices among residents and interns in two Iranian teaching hospitals.

## Methods

### Study Design and Settings

This study was a qualitative cross-sectional study carried out in two selected teaching hospitals of Tehran University of Medical Sciences (TUMS) in 2011.

### Sampling and Data Collection

A purposive sampling method (snowball method) was adopted to identify relevant respondents. We contacted potential participants to arrange for the interviews. The arrangements were achieved based on mutual agreement. Each interview was carried out face-to-face in the participant's office. Semi-structured questions were used to explore participants' utilization of PDAs. The mean interview time was approximately 15 minutes. The interviews were recorded using a digital voice recorder and then transcribed.

### Data Analysis

Interview transcripts were analyzed qualitatively using Constant Comparison Method [7]. According to this method, the investigator reads the transcripts and identifies major themes. Constant comparison of newly emerged themes with previous ones leads to subsequent discovery of new themes. This iterative process continues until no new major theme emerges, a situation called saturation [7]. While after 16 interviews near saturation was reached, the interviews were extended to another five subjects (total 21 participants) to ensure comprehensiveness of the identified themes.

## Results

### Demographic and Professional Characteristics

Among total subjects, 14.28% (3) were from the Urology Department, 4.76% (1) from Clinical Pharmacology Department, 9.25% (2) from Cardiovascular Department, 14.28% (3) from Internal Medicine

Department, and 4.76% (1) from Community Medicine Department. In addition, 52.28% (11) of the participants were interns and 33.3% were female.

### PDA Usage

#### General Usage

General PDA usage included personal information management (10), communication tools (9), dictionaries (6), note taking (9), calendar (7), word processing software (5), spreadsheet applications (5), and web browsing (11). One of the participants stated that "I have created an Excel file on my iPhone and stored my payments" (P8). One of the most popular uses of PDAs was web browsing to retrieve information over the internet. Other general uses of PDAs included entertainment, and photo taking.

All participants stated that they used PDAs in medical applications as well. The description of medical usage is outlined in the following sections.

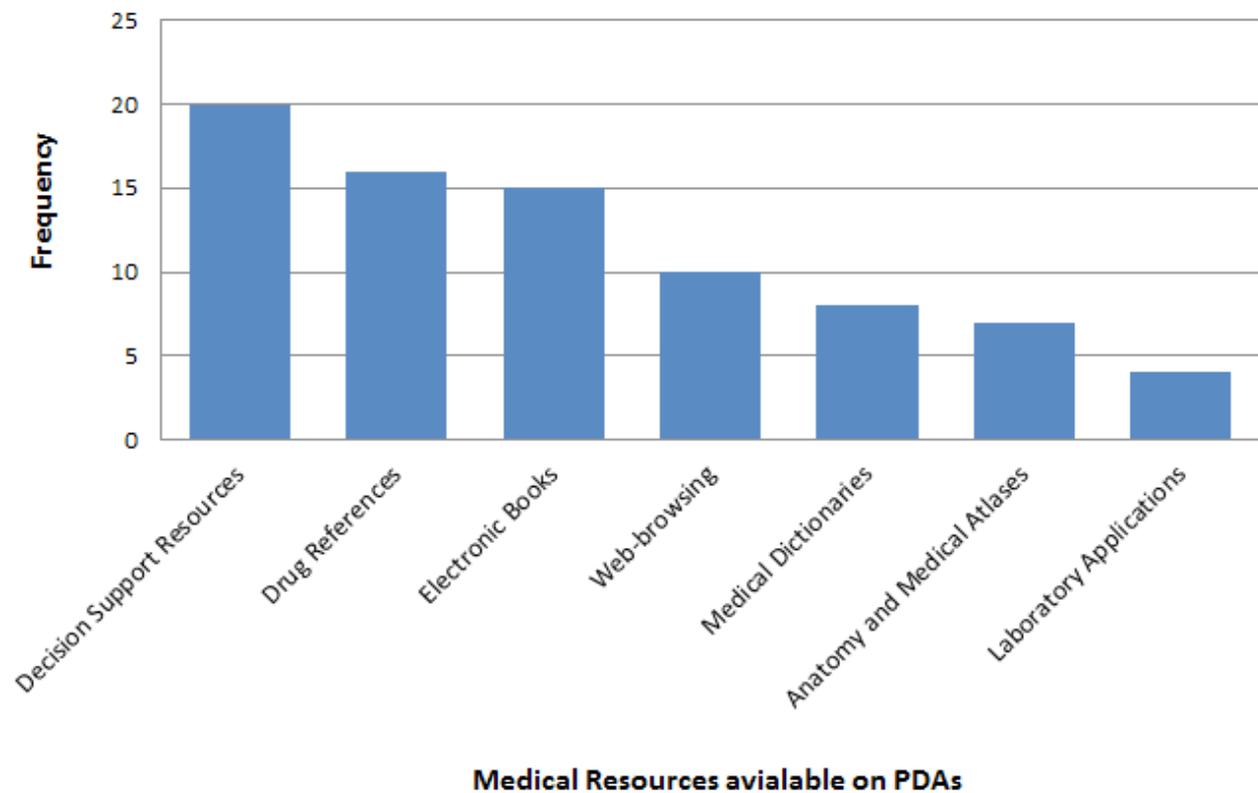
#### Medical Usage

##### *Accessing Medical Databases*

The most frequent medical usage of PDAs was related to clinical support decision resources. UpToDate® was by far the most frequently used medical database for daily clinical purposes (20 of 21). Only five subjects used PubMed to seek medical information. Participants expressed high satisfaction with the information accessed through UpToDate®. One reason for the high popularity of UpToDate® search was the limited familiarity of the participants with alternative medical information resources. In response to the question as to whether the participants were aware of other information resources such as PubMed, the typical answers were as follows: "Not really, but I think UpToDate® and Google meet my needs" (P9). "Yes, I know PubMed and Medline but I don't use them very often since I'm not quite familiar to how these databases work" (P16).

##### *Accessing Drug References*

Drug references were the second popular applications of PDAs for medical purposes. Sixteen clinicians stated that they referred to iPharm® and Lexi-drugs® as pharmaceutical guides. The drug references were typically used for identifying drug classes, interactions, dosages, mechanisms of action, adverse effects, toxicity, symptoms, and contradictions. Figure 2 illustrates a drug reference application on a handheld device.



**Figure 1** Frequency of use of handheld devices in clinical practices

#### *Reading Electronic Books*

Fifteen participants used PDAs to read electronic books for educational purposes. Electronic copies of Harrison Principles of Internal Medicine and Nelson Textbook of Pediatrics were the most-referred-to e-books. The interviewees expressed high satisfaction with the possibility of storing and reading e-books on PDAs. The reason was stated to be PDAs' large memory that permits the storage of many e-books, thus avoiding the need to carry heavy and bulky hardcopies. In addition, notation and highlighting of the text in e-books was readily possible.

#### *Web Browsing*

Ten clinicians stated that they used PDAs for retrieving medical information from the World Wide Web. Google was the only search engine used. Examples of Google usage for clinical information retrieval were finding CT images for better decision making and using Wikipedia to obtain general information about diseases. An intern stated that "I use

Google to search for background information, and the meaning of unfamiliar phrases or words. I also use this search engine to find radiography or other medical images" (P9). In contrast to Google search engine, Google Scholar was not used for clinical information retrieval.

#### *Medical Dictionaries*

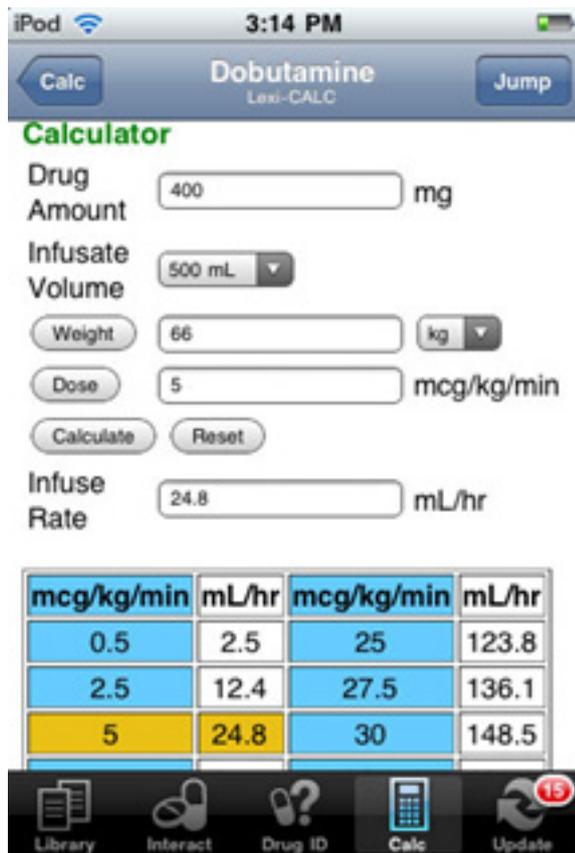
Eight participants used PDAs to look for unfamiliar terminologies in medical dictionaries.

#### *Anatomy and Medical Atlases*

Image-based applications on PDAs (Figure 3) facilitate viewing and analyzing medical images at the point of care. In addition, anatomy and medical atlases available on handheld devices help quick review of abstract medical information for diagnosis and decision making purposes. These PDA facilities were used by 7 clinicians.

#### *Laboratory Applications*

Four subjects reported using laboratory applications available on PDAs to retrieve the normal



**Figure 2** Lexi-drugs® calculator on a handheld device [12]

ranges of biological variables such as Complete Blood Count (CBC), White Blood Cell (WBC), Mean Corpuscular Volume (MCV), and other laboratory information.

## Discussion

The purpose of this study was to explore the pattern of medical PDA usage by Iranian interns and residents. All participants used PDAs for medical purposes. This situation reflects previous findings where most of the PDA-owning residents used it as an assistant tool in patient care delivery [8]. The most frequently used resources available on PDAs were clinical decision support resources (in particular UptoDate®) and pharmaceutical references that assist users in a quick review of drug properties. This practice pattern indicates that most uses of PDAs by residents/interns were those more directly associated with clinical care. This finding encourages further large-scale studies to examine whether a similar practice pattern is prevalent among other healthcare professionals, and to what extent it in-



**Figure 3** A radiology application shows a CT scan of the chest of a trauma patient [13]

fluences patient outcome. If a high prevalence and high impact is demonstrated, the barriers to its use should be identified and overcome.

Considering the diverse range of medical resources available on handheld devices, our study showed that the potential of PDAs in medical application is underused [9]. Almost one fourth of the participants did not use pharmaceutical guides, and the frequency of using medical dictionaries, medical atlases, and laboratory applications were less than the half. These figures indicate the need for training programs to achieve full potential of PDA use in medical practice [10].

The identified PDA usage themes in our study share a common aspect; they all allow for easy and immediate access to required data. For instance, use of e-books allows the user to quickly search in the text for a specific topic without wasting time and mental energy. Medical atlases, medical dictionaries and drug references provide similar advantages. The possibility of immediate retrieval of medical information at the point of care has the potential to improve patient care [11]. The more readily the required medi-

cal information is available, the safer and more effective medical practices would be, and the more fruitful learning process would become. However, to develop an evidence base in support of relevant intervention, well-designed studies on the medical usage pattern of PDAs and its impact on health care quality and patient outcome is required [3, 5, 11].

### Study Limitations

This study is by no means a comprehensive one. Qualitative study designs and the associated analytical methods usually limit sample size. In addition, only two hospitals were involved both being teaching hospitals affiliated with a single medical university. Moreover, the study included a limited number of medical branches, and involved only residents and interns. Therefore, caution should be exercised in generalization of the results to other branches of medicine, higher medical grades, and different types of healthcare settings.

### Conclusions

Using a purposively selected small sample of interns and residents, our study provided information about the use of PDAs by Iranian junior clinicians. The most frequently used medical resources on PDAs was decision support resources followed by pharmaceutical references and e-books. Half of the participants used PDAs to retrieve medical information by web browsing, and only a small number of respondents used laboratory applications. Our study indicated that the most frequent medical usages of PDA were those more directly associated with patient care. In addition, the participants were generally satisfied with medical applications on PDAs and perceived them as useful in both medical practice and education process. These findings call for further large-scale studies to examine whether a similar practice pattern is true of other clinicians in Iran, and whether PDA usage results in an improved patient care. Positive evidence in this regard would encourage efforts toward identifying and overcoming barriers to PDA usage by clinicians.

### Competing Interests

The authors declare that they have no competing interests.

### Authors' Contributions

SS designed the study and contributed to analyzing the data and editing the manuscript. IT carried out the inter-

views, transcribed the content and contributed to manuscript preparation. FEFA contributed to interpretation of the results and preparation of the draft manuscript. All authors read and approved the final manuscript.

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### References

- Phua J, Lim TK. How residents and interns utilise and perceive the personal digital assistant and UpToDate. *BMC Med Educ* 2008, **8**:39.
- Chatterley T, Chojecki D. Personal digital assistant usage among undergraduate medical students: exploring trends, barriers, and the advent of smartphones. *J Med Libr Assoc* 2010, **98**(2):157-60.
- Baumgart DC. Personal digital assistants in health care: experienced clinicians in the palm of your hand? *The Lancet*, **366**(9492):1210-22.
- Cornelius FH. Handheld technology and nursing education: utilization of handheld technology in development of clinical decision-making in undergraduate nursing students. *Ph.d.* Drexel university; 2005.
- Stroud SD, Smith CA, Erkel EA. Personal digital assistant use by nurse practitioners: A descriptive study. *J Am Acad Nurse Pract* 2009, **21**(1):31-38.
- Mazloomdoost D, Mehregan S, Mahmoudi H, Soltani A, Embi PJ. Perceived barriers to information access among medical residents in Iran: obstacles to answering clinical queries in settings
- Strauss AL, Corbin JM. *Basics of qualitative research: Techniques and procedures for developing grounded theory*: Sage Publications, Inc; 1998.
- Vogel EW, Gracely EJ, Kwon Y, Maulitz RC. Factors determining the use of personal digital assistants among physicians. *Telemed J E Health* 2009, **15**(3):270-76.
- Morris CG, Church L, Vincent C, Rao A. PDA usage and training: targeting curriculum for residents and faculty. *FAMILY MEDICINE-KANSAS CITY-* 2007, **39**(6):419.
- Daher R, Awada H. [The usefulness of personal digital assistants (Palm and Pocket PC) in the medical field]. *J Med Liban* 2007 **55**(1):19-28. [Article in French].
- Lindquist AM, Johansson PE, Petersson GI, Saveman BI, Nilsson GC. The use of the Personal Digital Assistant (PDA) among personnel and students in health

care: a review. *J Med Internet Res* 2008, **10**(4):e31.

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