BRIEF COMMUNICATIONS

Personal digital assistant usage among undergraduate medical students: exploring trends, barriers, and the advent of smartphones*

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Personal digital assistant (PDA) use is widespread and now considered an essential part of medical practice [1, 2]. These devices, also known as handhelds, allow health professionals to find answers to clinical questions while at the patient's bedside, resulting in better patient safety and clinical outcomes [3]. However, it has been found that PDA users, especially medical students, often struggle to use these tools to their full potential [4–7]. Health sciences libraries have responded by providing resources and services such as the evaluation of PDA programs and devices, instruction sessions on effective PDA use, and even the provision of technical support [8, 9].

Most of the literature that can be used to inform library practices in this area only briefly describes PDA usage patterns [10, 11], the types of activities performed with a PDA, or the most popular programs used [2, 5, 7, 12–17]. Some studies go slightly further and examine barriers to handheld computing [6, 7, 14, 18]. While a multitude of case studies superficially describe PDA initiatives implemented by libraries [19–22], few studies empirically examine the services and resources provided for medical students who use PDAs [23]. Finally, little to nothing has been written on how the advent of the smartphone has affected PDA usage and users' behaviours and needs [24].

Since 2001, the John W. Scott Health Sciences Library at the University of Alberta (U of A) has been providing services and resources for those using PDAs. These services have met with some success and have been cited and commended by a number of authors [19, 25, 26]. In an area where so much innovation and change takes place, it is necessary for libraries to maintain relevance by routinely assessing services and implementing improvements. This paper describes a study that was developed to inform the U of A's current PDA initiatives and subsequently addresses some of the gaps identified in the current body of literature on this topic.

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Supplemental appendixes A and B are available with the online version of this journal.

OBJECTIVES

The main objectives of this study were to assess PDA usage and the resource needs of U of A undergraduate medical students. In particular, the following research questions informed development of the survey that was used:

1. Which devices and operating systems are the most popular?
2. Which library resources are the most used and desired?
3. What type of content and which format for instruction are preferred?
4. How do students' PDA and computer use differ from and/or complement each other?
5. Has the advent of the smartphone changed PDA usage?

The resulting data will guide library collection development and user instruction policies and practices.

METHODS

After ethics approval was received, an online survey was distributed in February 2008 via an email discussion list to all 571 undergraduate medical students at the U of A (Appendix A, online only). The survey consisted of 19 questions and was designed to take between 10 and 15 minutes to complete. Questions related to the devices owned by students, their frequency of use, the ways students had learned to use their devices, the programs downloaded, and the types of library services desired by students.

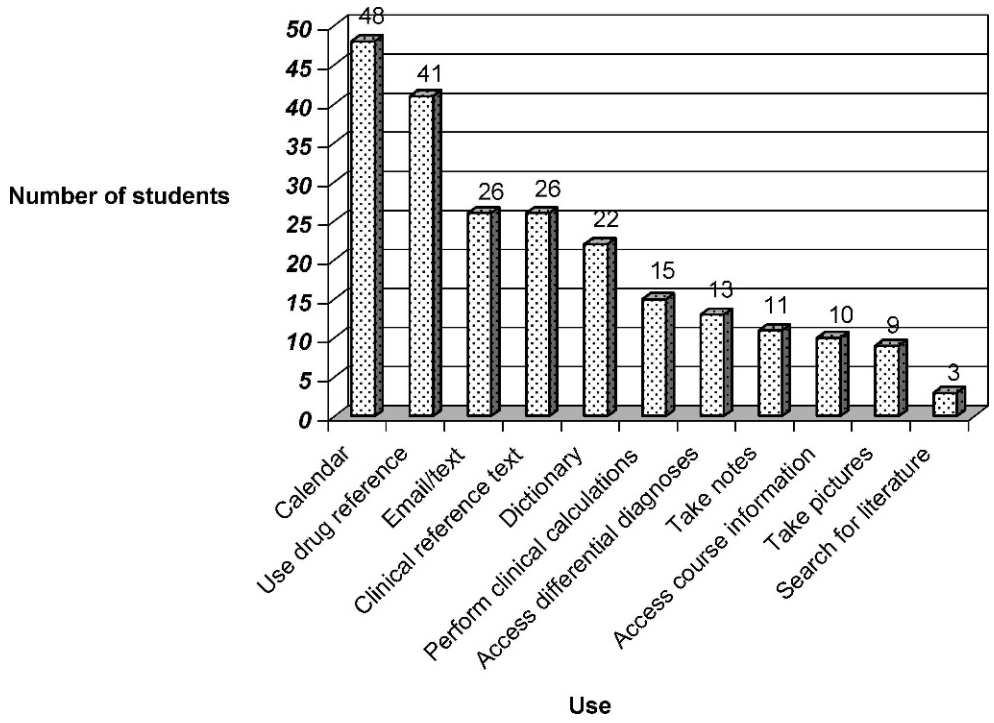
Three hour-long focus groups were held with a total of seven students. Questions (Appendix B, online only) differed slightly from those asked in the survey. Participants were asked what were barriers to their handheld usage, how their use of PDAs differed from their use of computers, and what the library's role was in service provision. Feedback was also sought on the library's PDA resource page.

RESULTS

Unfortunately, only 81 responses out of a potential 571 were received, for a low survey response rate of about 14% and a margin of error of 10.1% (or confidence interval of +/−10.1%, 95% confidence level). Numbers were extremely low for students in their third and fourth years of education (4/127, 3.1%, and 7/129, 5.4%, respectively), compared to students in first and second years (20/146, 13.7%; and 46/169, 27.2%, respectively). Focus group turnout was also very small, with 7 participants. However, conclusions were still drawn from the responses that were received.

Of survey respondents, 50 of 77 (64.9%) owned a handheld device with PDA functionality. PDAs were used for a combination of personal and scholarly tasks. With regard to usage for medical purposes, the most common functions were accessing drug refer-

Figure 1
Common uses of personal digital assistants (PDAs) among medical students (n=53)



ences (41/53 or 77.4% of students) and looking at clinical textbooks (26/53 or 49.1%). This ranking is consistent with previous surveys [2, 5, 7, 12–17]. Figure 1 shows the breakdown of the most common uses.

Focus group participants indicated that they use their devices as a complement to their computers, with each serving distinct functions. PDAs were accessed for quick reference questions, while computers were less cumbersome for searching the Internet and databases, reading textbooks, and writing notes or papers.

The majority of students (43/57 or 75.4%) indicated that they had learned to use their device through self-instruction. They less frequently turned to their peers for support (17/57 or 29.8%) or attended library instruction sessions (6/57 or 10.5%). Unfortunately, those with fewer technological skills often encountered difficulties. Twenty of 57 students (35.0%) indicated they were still trying to figure out their device, while comments made in the focus groups demonstrated some had given up altogether. These students were frustrated by the lack of technical support provided when they encountered difficulties. Students regularly had problems downloading programs, updating resources, using wireless Internet, and even such basic activities as emailing. The U of A Libraries do not currently provide assistance with these types of problems, nor do the university's computing services, leaving students' needs for support unmet.

Students expressed a desire for a wide variety of instruction sessions, from how to choose the right model, to use basic PDA features, and to use specific health sciences resources. Students expressed almost equal interest in online tutorial (25/62 or 40.3%) and small group interactive session (26/62 or 41.9%) formats, with far fewer requesting the traditional didactic lecture style of session (10/62 or 16.1%). Instructional sessions need to be targeted to specific segments of the user population to enhance their relevance, with instruction on purchasing a handheld offered separately from sessions on handheld resources.

Forty-one of 54 students (75.9%) only used freely available programs. Focus group commentary indicated that while the cost of PDA resources was evidently prohibitive for some students, the cost would not be a factor for others if they could be assured the resource would be useful. The U of A Libraries have an institutional license to PEPID, a medical reference and drug database, for Palm and PocketPC operating systems. An electronic version is also available for use on the Blackberry and iPhone. Eighty-two percent (41/50) of students who owned devices had downloaded PEPID, with the next most common download being Epocrates Rx (16/50 or 32.0%), a drug guide freely available for a wide variety of platforms. PEPID was also cited as the most useful program across all years of medical education and was therefore the most frequently consulted. Of the wide variety of paid resources available, UpTo-

Date was the most popular, having been purchased by 4 students. Many other students suggested the library purchase a subscription to this resource so they could access it for free.

Database searching on PDAs was of special interest to the researchers; however, not a single student had searched Ovid MEDLINE or PubMed on their PDAs. Focus group responses revealed that because of the cost of Internet access, the small screen size, the slower processing speed of PDAs, and slower typing capabilities, students in all years preferred to use computers for any in-depth literature or Internet searching.

DISCUSSION

PDAs have evolved as the world of mobile technologies has expanded. PDA functionality is now sought not in standalone devices, but as a feature integrated into cell phones. While many students still own traditional PDAs, most desire smartphone options. General usage patterns for these newer devices are not drastically different from their predecessors. With the iPhone now for sale in Canada (it was not available at the time of the survey), the shift toward integrated devices is expected to progress even further.

Libraries need to define their role with regard to provision of services and resources for handhelds. Will they provide services at all? If yes, where will the line be drawn? Will they provide resources, technical assistance, instruction, or all of the above? The answers to these questions will depend on the amount of time and money the library is willing to invest.

The cost of handheld resources is a barrier not just for students, but for libraries as well. The U of A does not recommend a single standard handheld platform, thus making collection work expensive because of the variety of operating systems requiring resources. Licensing models for handhelds are improving, but the library's collections will still remain somewhat limited and students will have to continue purchasing at least some resources for themselves.

The John W. Scott Health Sciences Library is currently revamping the U of A PDA resource guide. This page offers a list of PDA resources available for free or for purchase, as well as links to sites to assist with an individual's selection of handheld device. Addition of an evaluative service was expressed as potentially useful. The list of available resources, as was presented on the library website [27], would have an added benefit if those resources were described in more detail and ranked by utility. More extensive descriptions have been incorporated based on this feedback, and the site now allows users to rate specific resources.

Library managers have determined that providing technical assistance is not part of the U of A Libraries' role. With the wide variety of platforms and devices available, it would be impracticable to be familiar with all of them. However, librarians can become mediators where technical assistance is concerned. Information about whom to contact when technical issues are encountered will be added to the library's PDA website, as well as quick tips on what to try when experiencing some of the most common problems.

Instructional sessions should be provided in a format that would best serve the needs of the students. Small group, interactive sessions would take a tremendous amount of time for the librarians involved, and unless the class were made mandatory, many students would be unlikely to attend. Online tutorials would be less resource intensive and could be completed at the students' leisure, though actual participation might be limited because of time constraints. These options are being assessed.

The results of this research project have several limitations. The response rate was low, with only 81 out of a potential 571 students (14%) across all 4 years responding to the questionnaire. Recruiting participants for the focus group sessions also proved extremely difficult. The results obtained might therefore not be representative of the entire medical student population at the U of A and are not broadly generalizable. The survey looked only at medical students and therefore does not represent the current practices or needs of students in other health sciences disciplines. The study was conducted when the iPhone was unavailable in Canada. Therefore, results likely underestimate current use of integrated devices. Recent evidence suggests that, despite the iPhone having been made available only 1 year ago, it is already being used extensively at a Nova Scotian hospital, with 24% of residents owning the device [28].

Gaps in the research remain, and additional qualitative studies are needed. These studies will hopefully be based on large sample sizes across various medical disciplines so that the picture of handheld use in medical education can be completed.

CONCLUSION

The information collected by this study will be used to inform collection development and instruction policies and practices for handheld technologies at the John W. Scott Health Sciences Library, U of A. In discovering current usage trends and the types of resources most often utilized and desired by undergraduate medical students, the library will be better able to provide resources of the highest importance to U of A medical education and to provide training to help students use those resources more effectively.

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