ABSTRACT

This article studies physicians’ mobile user experiences with evidence-based medical guidelines and drug information databases through the concept of webflow. Data was collected among the 352 users of a mobile medical application. The response rate was 66.5% (n=234). The results demonstrate that rather than usefulness and ease of use it is the orientation and navigation within the system in par with perceived challenges, focused attention, and learning that lead to positive user experience. Finding relevant pieces of information becomes essential in system utilization. The results also support the claim that mobile applications are not only beneficial for patient safety but they may also improve the physicians’ computer and professional skills. Frequent use was noted to improve physicians’ computer skills, the feeling of being in control of the system, and their perception of the system’s ease of use. Moreover, learning may play a greater role for knowledge work than often suggested. [Article copies are available for purchase from InfoSci-on-Demand.com]

Keywords: Ease of Use; Evidence-based Medicine; Flow; Healthcare Informatics; Medical Knowledge; Usefulness; User Experience

INTRODUCTION

Mobile medical informatics applications (Siau, 2003) have been suggested as enabling convenient access to information for physicians despite the constraints of time and place. These applications seem promising to assist clinicians in managing medical literature and drug infor-
mation, as well as helping them access relevant information at the point of care (Ebell et al., 1997). The applications may also be used to assist in evidence-based practice in a clinical setting and support the educational needs of physicians (Honeybourne et al., 2006). Moreover, such applications could reduce medication errors (Grasso & Genest, 2001; Dallenbach et al. 2007), improve the quality of care in general by improving the efficiency and effectiveness of medical decision making (Sackett & Strauss, 1998; Rothschild et al., 2002).

The application of new technologies in healthcare settings is, however, constantly generating challenges for various segments of the healthcare organization (from all levels of the management to physicians, nurses as well as patients). For example, even if mobile systems seem to be relatively smoothly incorporated into the workflow of physicians (Rothschild et al., 2002), it is by no means guaranteed that the medical staff will use these systems. Positive user experience has been identified as one of the key factors for achieving technology acceptance (Ghani, 1991). Previous research has shown that positive user experience may improve learning (Choi et al., 2007; Ghani & Deshpande, 1994) and consumer behavior (Nel et al., 1999). From the perspective of physicians, positive user experience could mean, for instance, the enhancement of professional skills through learning (Choi et al., 2007). Specifically, in healthcare settings, enhanced professional skills can have a major impact on the quality of patient treatment.

Providing access to medical literature increases the extent to which evidence will be sought and incorporated into patient care decisions (Sackett & Straus, 1998). This form of decision making is referred to as evidence-based medicine, and it is defined as “the conscientious, explicit and judicious use of the current best evidence in making decisions about the care of individual patients” (Sackett et al., 1996). Providing access to medical literature through a mobile application supports physicians’ knowledge work carried out by the bedside or at the point of care. Mobile devices containing decision making tools and summaries of evidence may improve deeper understanding of evidence-based medicine (Honeybourne et al., 2006) and even reduce patients’ length of stay in hospitals (Sintchenko et al., 2005).

Grasso and Genest (2001) demonstrated that access to drug information, i.e. pharmacopoeias, may reduce medication errors (Grasso & Genest, 2001), as it is impossible in practice to remember or know all conceivable drug interactions. Thus, providing a convenient means to double-check these interactions should indeed help physicians. The survey conducted by Rothschild et al. (2002) with palmtop drug information guide users suggests that mobile systems may save time in information retrieval and improve drug-related decision making.

There are still relatively few scientific studies on the actual use of mobile medical applications (Fischer et al., 2003). This article focuses on accessing medical literature, in particular evidence-based medical guidelines and electronic pharmacopoeias. It aims at exploring the actual user experiences perceived by physicians in using such mobile applications.

The article is organized as follows: Section 2 describes the concept of flow for measuring user experience. Section 3 introduces the research method and the system under investigation, and section 4 describes the key research results from the survey. Finally, section 5 discusses the results and section 6 draws conclusions and lays out the limitations on the findings.

**BACKGROUND**

In his visionary book, Csikszentmihalyi (1977) describes the construct of flow as “the holistic sensation that people feel when they act with total involvement”. Flow has been suggested for studying consumer behavior in the context of web-based electronic commerce (Hoffman & Novak, 1997). Hoffman and Novak (1996) describe flow as being a state which occurs when navigating in the Web and which is intrinsically enjoyable, self-reinforcing and
accompanied by a loss of self-consciousness. They also suggest that flow experience can exist in both experimental and goal-oriented types of behavior.

As a measurable concept, flow can be inferred from its antecedents and consequences (Oinas-Kukkonen, 2000). A primary antecedent condition that is necessary for the flow state to be experienced is that skills and challenges are perceived to be congruent and above a critical threshold (Hoffman & Novak, 1996). If the skills of the users are high, but the challenges are low, (s)he may fall into boredom, while if their challenges are high, but the skills are low, they may fall into anxiety. If both the challenges and skills are too low, users may fall into apathy.

We adopt the definition of Oinas-Kukkonen (2000) for modeling the concept of webflow (while this construct is noted as ‘webflow’, it is equally applicable to mobile or other information systems that require extensive navigation from the user):

Webflow is an optimal perceived user experience which improves a system user’s orientation and navigational use, as well as vice versa, and which is predicted by balanced user skills and the feeling of the system to be enjoyably challenging, the feeling of being in control of system use, and the perceived ease of use and usefulness of the system. Content and functionality provided by the system help keep user skills and challenges above a critical threshold through focused attention and learning.

Based on this definition (Oinas-Kukkonen, 2000), a research vehicle for measuring webflow is presented in Figure 1.

The user’s feeling of being in control over the system in use may cause webflow.

**Ease of use** is an intermediate variable between skills and flow. In the model, high skill level implies that the system is easier to use, which may cause webflow.

**Usefulness** is an intermediate variable between challenges and webflow. This is supported by the widely utilized technology acceptance model, which suggests that perceived ease of use and perceived usefulness predict technology acceptance (cf. Davis, 1989; Venkatesh & Davis, 2000; Venkatesh et al., 2003). In the model, higher challenges mean that consumers perceive the system useful, which may cause webflow.

Two intermediary concepts, learning and focused attention, may also be found in the hypothetical model between the content and functionality provided by the system and the skills and challenges.

**Learning** is an intermediate variable between skills and system, because through using the system users may learn new skills.

**Focused attention** is an intermediate variable between challenges and system, because through persuasive content and functionality user attention focus may rise.

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Figure 1. Research model for studying the flow user experience
The webflow and its antecedents and consequences were measured through a Web-based survey among the users of a mobile healthcare information system to see which of the hypothesized causal relationships are found to be true in the mobile context. The main hypotheses related to the webflow are presented in Table 1 (see also Figure 1).

In addition to this, special emphasis was put on how the different subsystems of the case system affect the user experience perception. As most of the physicians' work - if not all - is knowledge-based, concepts such as learning and usefulness are expected to have a heavier impact on user experience than in some other domains such as electronic commerce.

**METHODS**

To study physicians' user experiences, we approached Finnish Medical Association Duodecim, which is a scientific society with almost 90% (over 18,000) of Finnish physicians and medical students as members. Duodecim has developed both Web information systems as well as mobile solutions to help the work of physicians. A mobile healthcare information system, containing a set of medical information and knowledge databases, was chosen as the case system for this study. The system emphasizes the role of evidence-based medical guidelines (EBMG), which is a collection of clinical guidelines, for primary care combined with the best available evidence. The collection includes primary care practice guidelines (including both diagnosis and treatment), evidence summaries supporting the recommendations, photographs and images of all common and many rare dermatological conditions, electrocardiograms and eye pictures as well as abstracts from the Cochrane Library, which is a collection of databases in medicine and other healthcare specialties.

The system also contains the pharmacology database Pharmaca Fennica, a drug interaction database for drug-related decision making, the international diagnosis code guide ICD-10, an acute care guide, a medical dictionary, and a comprehensive database of healthcare-related addresses and contact information in Finland. The subsystems are presented in Table 2. The system is typically used through advanced mobile phones and it is delivered to users in a memory card that includes a search engine, user interface software and the core databases. Some earlier studies of this system (Han et al., 2004a; Han et al., 2005) have demonstrated that physicians have a positive perception of it and intend to use it, and that the most frequently requested mobile content entities are EBMGs, Pharmaca Fennica and ICD-10.

**Table 1. The hypotheses of the study**

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>The higher the perceived learning, the higher the webflow.</td>
</tr>
<tr>
<td>H2</td>
<td>The higher the perceived focused attention, the higher the webflow.</td>
</tr>
<tr>
<td>H3</td>
<td>The higher the perceived skills of the user, the higher the webflow.</td>
</tr>
<tr>
<td>H4</td>
<td>The higher the perceived feeling of control, the higher the webflow.</td>
</tr>
<tr>
<td>H5</td>
<td>The higher the perceived challenges, the higher the webflow.</td>
</tr>
<tr>
<td>H6</td>
<td>The higher the perceived ease-of-use of the system, the higher the webflow.</td>
</tr>
<tr>
<td>H7</td>
<td>The higher the perceived usefulness of the system, the higher the webflow.</td>
</tr>
<tr>
<td>H8</td>
<td>The higher the perceived orientation, the higher the webflow.</td>
</tr>
<tr>
<td>H9</td>
<td>The higher the perceived navigation, the higher the webflow.</td>
</tr>
</tbody>
</table>
The data for our study was collected through the Internet during a two-week period from January 23 to February 7, 2007. We approached all of the 352 users of the mobile system by email which contained a link to the online questionnaire. The users were all physicians who had a smartphone of their own and the software installed in it (donated by a large international medical company). The questionnaire contained 21 questions to be answered on a 5-point Likert scale from “Completely disagree” to “Completely agree” with the choice “I do not know” in the middle (see Appendix 1). This scale was chosen as the users of the system are familiar with it as it has been used in previous studies of the system (cf. Han et al., 2004b; Han et al., 2006). The response rate was 66.5% (n=234). Two responses were deleted from the data set because the responses revealed that the respondents did not actually use the system. Thus, the final data set consisted of 232 replies.

Independent Samples T-Tests (using SPSS) were performed to see how the usage of various subsystems affected user experience. For example, it was studied whether the users of the drug interaction subsystem learned better or more than those who did not use it. Chi-Square tests were also performed.

Due to the fact that we collected data only from the users of this one system we could not compare the usage of the system with other similar systems. This limits our study. Also some of the subsystems were used by almost all of the participants, which made comparing users with non-users not possible. The picture database had not yet been installed for use by all of the study participants, which limits the results concerning this subsystem.

### RESULTS

About three out of five respondents (62.3%, n=144) were men and 37.2% (n=86) were women. Three out of five respondents (61.9%, n=143) were specialists, 27.3% (n=63) were general practitioners, and 10.4% (n=24) researchers or working in administrative positions. More than half of the respondents (55.8%, n=129) had more than 20 years of experience of working as a physician, while 32.0% (n=74) had over ten years of experience and only 12.1% (n=28) had less. The majority of the physicians worked daily with patients (80.5%, n=186), nurses (86.6%, n=200) and other physicians (85.3%, n=197).

Almost half of the physicians used the information system daily (45.9%, n=106), 37.7% (n=87) several times a week, 11.7% (n=27) once a week, 3.9% (n=9) once a month and only two used it less often than once a

<table>
<thead>
<tr>
<th>Duodecim database</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBM Guidelines</td>
<td>Search for evidence-based guidelines including literature references and</td>
</tr>
<tr>
<td></td>
<td>abstracts from the Cochrane Library.</td>
</tr>
<tr>
<td>Pharmaca Fennica</td>
<td>Drug lists, adult and paediatric dosing guidelines, common side effects.</td>
</tr>
<tr>
<td>ICD-10</td>
<td>International Statistical Classification of Diseases and Related Health</td>
</tr>
<tr>
<td></td>
<td>Problems. Codes for classifying diseases and a wide variety of signs and</td>
</tr>
<tr>
<td></td>
<td>symptoms.</td>
</tr>
<tr>
<td>Acute Care Guide</td>
<td>Pathogenesis, causes, symptoms, differential diagnosis.</td>
</tr>
<tr>
<td>Drug Interaction Database</td>
<td>Possible interaction effects of selected drugs.</td>
</tr>
<tr>
<td>Medical Picture Database</td>
<td>Descriptions of symptoms, pictures.</td>
</tr>
<tr>
<td>Contact Information</td>
<td>Search for contact information on pharmacies, hospitals and health centers.</td>
</tr>
</tbody>
</table>
month. The two most frequently used parts were Pharmaca Fennica drug information and EBMG. The least used were the Medical Picture Database and Acute Care Guide. The most and least frequently used parts of the system seem to be the same as reported before (see Han et al., 2004a). The Medical Picture Database was only recently introduced into the system and not all physicians had access to it yet. The medical society estimated that about half of the physicians had access to this database. Besides using the mobile application, 27.7% (n=64) of the physicians read emails through the mobile device and 36.4% (n=84) used it for other Internet services.

Figure 2 displays the prerequisites that were found to predict webflow. These are navigation (H9, Pearson’s correlation, r=0.653, p=0.000), learning (H1, r=0.417, p=0.000), focused attention (H2, r=0.392, p=0.000), challenges (H5, r=0.382, p=0.000), and orientation (H8, r=0.365, p=0.000). Similar findings have been reported in previous Webflow research (Oinas-Kukkonen, 1999). Quite interestingly, learning and focused attention correlated with each other (r=0.490, p=0.000) as well as did navigation and orientation (r=0.452, p=0.000), whereas perceived challenges did not correlate with the other prerequisites.

The usage of different subsystems and how they were experienced by physicians were investigated through comparing users and non-users with Independent Samples T-tests. EBMGs form the core part of the mobile application, being used by most of the physicians (only 12.5%, of the physicians didn’t use it, n=27). The usage of EBMGs improved the perception of focused attention (F=2.064, p=0.000), learning (F=2.767, p=0.001), and webflow (F=2.004, p=0.007), and to some extent skills (F=0.144, p=0.019) and navigation (F=5.266, p=0.042). See a summary of the T-tests in Table 3, in which the ** marks significance smaller than 0.01, while * marks significance smaller than 0.05. The data set did not enable us to compare users and non-users of Pharmaca Fennica drug information, because only eight physicians did not use it.

ICD-10 plays an essential role in the hospital bureaucracy as its codes are utilized in numerous different settings, but it is also utilized in support of diagnosing and decision making. The users of the ICD-10 classification (n=131, 56.5%) perceived some improvement in navigation (F=2.778, p=0.012), the feeling of being in control (F=1.357, p=0.023), and skills (F=0.064, p=0.029).

In acute medical situations, new knowledge must be acquired quickly, at the point of care. The physicians may not have time to consult other colleagues or search for information in medical books. Acute Care Guide usage (n=91, 39.2%) improved learning (F=4.779, p=0.000)
and usefulness (F=19.187, p=0.005). Orientation (2.094, p=0.018) was slightly improved.

Drug Interaction Guide usage (n=124, 53.4%) improved webflow (F=6.493, p=0.000) and learning (F=1.433, p=0.003), and to some extent navigation (F=2.407, p=0.029) and usefulness (F=6.417, p=0.047).

Medical Pictures Database usage (n=46, 19.8%) was perceived relatively easy to use (F=3.131, p=0.015) and at least to some extent it improved skills (F=6.495, p=0.046) and learning (F=1.125, p=0.050). Improved learning may be a result of the fact that many diseases may be diagnosed through comparing visual observations and symptoms with graphical pictures and other visual presentations. The usage of Contact Information subsystem (n=171, 73.4%) slightly improved the physicians’ perception of skills to use mobile services (F=6.495, p=0.046).

Quite naturally, the less experienced physicians felt more often that the system helped them to learn new things ($\chi^2=15.445$, p=0.000), and to some extent they also found it more useful than did the more experienced physicians ($\chi^2=7.459$, p=0.024). See Table 4.

Interestingly, there were slight differences in how general practitioners and specialists perceived the software application. General practitioners seemed to learn more from it than specialists did (F=8.916, p=0.047). Admittedly, a specialist’s area of expertise is more focused while a general practitioner has to treat patients with a much wider variety of symptoms. This may also explain why general practitioners perceive the system as more useful (F=17.238, p=0.038).

The frequency of use also seemed to have an effect on how the system was perceived. Those who used the system daily felt being in control of the system use (F=0.698, p=0.001), they perceived it easy to learn (F=0.641, p=0.001), they felt the system useful (F=20.339, p=0.003), and they perceived themselves well-oriented in using the system (F=0.435, p=0.007). Daily users perceived to some extent higher personal skills (F=2.996, p=0.011), and higher webflow (F=1.225, p=0.014). They also found the system easier to use (F=0.082, p=0.023), and they perceived the navigational facilities better (F=0.404, p=0.033) than those who used it less frequently.

Table 3. Different databases and their effect on the user experience

<table>
<thead>
<tr>
<th>Database</th>
<th>Learning</th>
<th>Focused Attention</th>
<th>Skills</th>
<th>Challenges</th>
<th>Control</th>
<th>Ease of Use</th>
<th>Usefulness</th>
<th>Orientation</th>
<th>Navigation</th>
<th>Webflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence-Based Medical Guidelines</td>
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<tr>
<td>Drug Information</td>
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<tr>
<td>ICD-10 Classification</td>
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<tr>
<td>Acute Care Guide</td>
<td>**</td>
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<tr>
<td>Drug Interactions</td>
<td>**</td>
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<td></td>
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<td>**</td>
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<tr>
<td>Medical Pictures</td>
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<tr>
<td>Contact Information</td>
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</tbody>
</table>

Table 4. Differences in user perception between general practitioners and specialists

<table>
<thead>
<tr>
<th>Perception</th>
<th>GP (%)</th>
<th>SP (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning</td>
<td>0.641</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Skills</td>
<td>2.996</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>Usefulness</td>
<td>20.339</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td>0.435</td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>Navigation</td>
<td>1.225</td>
<td>0.014</td>
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</tr>
<tr>
<td>Webflow</td>
<td>0.404</td>
<td>0.033</td>
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</table>
Discussion

The results provide support for the claim put forward by Honeybourne et al. (2006) that mobile applications may not only be beneficial for patient safety but for improving the professional skills of the physicians as well. The use of the system improves physicians’ computer skills as well as the feeling of being in control of system use and the perceived ease of use. These may help, at least to some extent, in navigation and orientation which will make it easier to find relevant knowledge and information.

Balanced orientation and navigation within the system use and the feeling of being challenged have a direct effect on webflow, i.e. gaining optimal user experience. Surprisingly, ease of use and usefulness did not have a direct effect on user experience. Moreover, learning correlated strongly with webflow. The knowledge work of physicians is mainly cognitive related to areas such as diagnosing and making decisions over treatments or medication. Physicians use multiple different kinds of information systems for fulfilling these tasks and they seek support and evidence for their reasoning. The ease of use per se is not a virtue. Most importantly the information provided for them has to be helpful. Thus, the optimal user experience is closely related to such information that actually helps the physicians perform their job better. Finding relevant pieces of knowledge becomes essential.

Table 4. The effect of experience on learning and perceived usefulness

<table>
<thead>
<tr>
<th>Experience</th>
<th>Learning (χ²=15.445, p=0.000)</th>
<th>Useful (χ²=7.459, p=0.024)</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 10 years (n=28)</td>
<td>81.5%</td>
<td>92.9%</td>
</tr>
<tr>
<td>10-20 years (n=74)</td>
<td>58.1%</td>
<td>86.3%</td>
</tr>
<tr>
<td>over 20 years (n=129)</td>
<td>42.2%</td>
<td>74.2%</td>
</tr>
</tbody>
</table>

The usage of evidence-based medical guidelines and drug interaction guides increased the perception of both webflow and learning. The Acute Care Guide was perceived highly useful and its usage also improved learning. This may be explained by the critical role that it may play in emergencies. The knowledge it provides may sometimes save lives. Even if Acute Care Guide improved learning, it did not affect webflow. Perhaps the nature of acute medical situations is different from situations where evidence-based guidelines or drug interaction information are needed. Even if physicians learn more deeply what to do in specific emergency situations, they do not necessarily have time to reflect their actions in those situations. Thus, the user experience in acute situations may not always be as enjoyable as it may be in a more peaceful setting.

Previous research has shown that learning is a consequence of flow, i.e. people who perceive flow have better learning outcomes than people who do not perceive flow (cf. Hoffman & Novak, 1996, Choi et al. 2007). The findings in this research point out that the interplay between webflow and learning truly is crucial in the knowledge work context. When a knowledge worker learns (s)he perceives webflow, and when (s)he perceives webflow (s)he learns. Webflow seems to have a dual role both as a consequence and as an antecedent.

This finding also seems to imply that the traditional causal models of flow do not capture the dynamic nature of the phenomenon well. Most of the current flow models regard the flow as a state which occurs when certain conditions are met. In contradiction to this, Pearce and Howard (2004) have demonstrated that flow may change rapidly during computer-human interaction. It could indeed be that a physician
who has used the system continuously for some time will slowly “fall out” of flow if (s)he does not have some additional stimuli to keep him/her in flow. Our findings suggest that learning could be that kind of a stimuli.

CONCLUSION

Overall, this article provides some practical information about the physicians’ use of mobile software applications. It presents a study on mobile user experiences with evidence-based medical guidelines and drug information databases through the concept of flow. The results demonstrate that it is the orientation and navigation within the system, rather than usefulness and ease of use, in par with perceived challenges, focused attention and learning in using it that lead to positive user experience. This supports the fact that finding relevant pieces of information is essential in the system utilization. The results also provide support for the claim that mobile applications may not only be beneficial for patient safety but also for improving the computer and professional skills of the physicians.

The frequent use of the system was noted to improve physicians’ computer skills, the feeling of being in control of the system, and their perception of the system’s ease of use. Moreover, the results suggest that the knowledge provided by evidence-based medical guidelines and drug information databases help physicians to learn new things. In more general terms, the findings suggest that learning may play a greater role for knowledge work than often suggested. In the future, more light should be shed on the interplay between learning and positive user experience. Longitudinal approaches would be desirable.

LIMITATIONS

Before closing, it is important for the readers to note several limitations of this reported study.

Due to the fact that data was collected only from the users of this one system we could not compare the usage of the system with other similar systems, which limits our study. Nonetheless, it was still possible to investigate the different subsystems. However, whenever the subsystems were used by almost all of the participants, comparing users with non-users for these subsystems become limited. As well, with the picture database subsystem not yet been installed into use by all of the participants, it also limits the results concerning this subsystem.

Put together, the research setting would have been richer had there been a greater variety in the professional experience of the participants. In this study, most of the physicians were comparatively experienced. The less experienced ones as well as younger physicians might have slightly different mobile system usage patterns.

REFERENCES


APPENDIX

Demographics

1. Gender Male / Female
2. Experience Less than 1 years / 1-5 years / 5-10 years / 10-20 years / over 20 years
3. Occupation General practitioner / Specialist / Researcher / Management position
4. I use the mobile databases Daily / A few times a week / Once a week / Once a month / Less than once a month
5. I use the following parts of the system
   - EBM guidelines
   - Pharmaca Fennica
   - ICD-10
   - Acute care guide
   - Drug interactions
   - Picture database
   - Connection information
6. I work with hospital management Daily/A few times a week/Once a week/Once a month/Less than once a month/Never
7. I work with physicians Daily/A few times a week/Once a week/Once a month/Less than once a month/Never
8. I work with nurses Daily/A few times a week/Once a week/Once a month/Less than once a month/Never
9. I work with patients Daily/A few times a week/Once a week/Once a month/Less than once a month/Never

The Medical Databases

Please, answer using these criteria:
1 = Completely disagree
2 = Partially disagree
3 = I don’t know
4 = Partially agree
5 = Completely agree

10. This mobile service makes me to learn new things. 1 2 3 4 5
11. I feel totally focused, when I am using this mobile service. 1 2 3 4 5
12. I am skilled at using mobile services. 1 2 3 4 5
13. This mobile service is enjoyably challenging. 1 2 3 4 5
14. I often feel uncertainty when using this mobile service 1 2 3 4 5
15. I feel that this mobile service is easy to use. 1 2 3 4 5
16. In my opinion, this is a well-designed mobile service. 1 2 3 4 5
17. In my opinion, it is easy to perceive the information content and structure of this mobile
18. It is enjoyable to navigate in this mobile service. 1 2 3 4 5
19. Using this mobile service is enjoyable. 1 2 3 4 5

**The Use of Mobile Internet**

20. Do you read email with your mobile phone  Yes / no
21. Do you use your mobile phone for other internet services. Yes / no