

# Mobile Health (mHealth) Services and Online Health Educators

Muhammad Anshari<sup>1</sup> and Mohammad Nabil Almunawar<sup>2</sup>

<sup>1</sup>Universiti Brunei Darussalam, Brunei Darussalam. <sup>2</sup>School of Business and Economic, Universiti Brunei Darussalam, Brunei Darussalam.

**ABSTRACT:** Mobile technology enables health-care organizations to extend health-care services by providing a suitable environment to achieve mobile health (mHealth) goals, making some health-care services accessible anywhere and anytime. Introducing mHealth could change the business processes in delivering services to patients. mHealth could empower patients as it becomes necessary for them to become involved in the health-care processes related to them. This includes the ability for patients to manage their personal information and interact with health-care staff as well as among patients themselves. The study proposes a new position to supervise mHealth services: the online health educator (OHE). The OHE should be occupied by special health-care staffs who are trained in managing online services. A survey was conducted in Brunei and Indonesia to discover the roles of OHE in managing mHealth services, followed by a focus group discussion with participants who interacted with OHE in a real online health scenario. Data analysis showed that OHE could improve patients' confidence and satisfaction in health-care services.

**KEYWORDS:** mobile health, social networks, online health educator, Brunei, Indonesia

**CITATION:** Anshari and Almunawar. Mobile Health (mHealth) Services and Online Health Educators. *Biomedical Informatics Insights* 2016;8 19–27 doi: 10.4137/BII.S35388.

**TYPE:** Original Research

**RECEIVED:** September 22, 2015. **RESUBMITTED:** February 01, 2016. **ACCEPTED FOR PUBLICATION:** February 03, 2016.

**ACADEMIC EDITOR:** John P. Pestian, Editor in Chief

**PEER REVIEW:** Ten peer reviewers contributed to the peer review report. Reviewers' reports totaled 2,488 words, excluding any confidential comments to the academic editor.

**FUNDING:** Graduate Research Scholarship, Universiti Brunei Darussalam, Brunei Darussalam. The authors confirm that the funder had no influence over the study design, content of the article, or selection of this journal.

**COMPETING INTERESTS:** Authors disclose no potential conflicts of interest.

**CORRESPONDENCE:** nabil.almunawar@ubd.edu.bn

**COPYRIGHT:** © the authors, publisher and licensee Libertas Academica Limited. This is an open-access article distributed under the terms of the Creative Commons CC-BY-NC 3.0 License.

Paper subject to independent expert blind peer review. All editorial decisions made by independent academic editor. Upon submission manuscript was subject to anti-plagiarism scanning. Prior to publication all authors have given signed confirmation of agreement to article publication and compliance with all applicable ethical and legal requirements, including the accuracy of author and contributor information, disclosure of competing interests and funding sources, compliance with ethical requirements relating to human and animal study participants, and compliance with any copyright requirements of third parties. This journal is a member of the Committee on Publication Ethics (COPE).

Published by Libertas Academica. Learn more about this journal.

## Introduction

Health-care staffs have always been critical factors in the health-care process. They have several responsibilities in dealing with their patients,<sup>1</sup> including assisting doctors in recording patients' personal and medical conditions, advising or educating patients and their families on health issues related to the patients, operating medical equipment, administering medications and treatment, and assisting patients for follow-up and further treatment or rehabilitation.<sup>2</sup>

Advances in mobile technology require a redesign in the roles of health-care professionals in caring for patients online. Nowadays, health-care staffs increasingly use Information and Communication Technology (ICT) to improve services<sup>3</sup> and perform their duties in many ways like nurses' work in accessing and updating patients' history online. However, services can be significantly increased through mobile technology as most patients nowadays have mobile devices to access services.

Interactions between health-care staffs and patients can be done online or partly online, and all information related to these interactions can be stored automatically or semiautomatically (if they are done partly online) in electronic format that can be easily accessed or processed.<sup>4</sup>

Recent Web technology has allowed various modes of interaction and at the same time provided new services through social networks to empower patients. Patients are enabled with the ability to access their electronic health records (EHRs) through the Web, as most of them own smart mobile devices such as smartphones that can be used to access the Internet. This means that providing services accessible through this media (mHealth) is advantageous toward patients as it empowers them. Thus, this needs to be properly designed, and new roles for health-care staffs need to be properly defined.<sup>5</sup> Various mobile services offered by mHealth can revolutionize health-care practices in the context of managing patients through smartphones or other mobile devices.<sup>6</sup>

In order to support mobile services through the mHealth initiative, this study proposes the concept of an online health educator (OHE). An OHE is a well-trained person or multiple individuals or an interprofessional team who are dedicated to manage and look after mHealth services. The OHE establishes patients' relationship and the duty to provide caring through mHealth and continues maintaining throughout the interaction, including any information on follow-up and ongoing health care through mHealth services.



## Literature Review

Besides supporting daily operations and services to patients, ICT can also channel information and knowledge to health-care staffs and patients quickly. ICT can be used to educate and empower patients in the health-care process.<sup>7</sup> Health-care staffs and patients can help other patients in finding and understanding treatment or expertise-related information, as well as other related resources. Information and knowledge that can be easily accessed through ICT can also be used to teach patients in minimizing harmful behavior and thus have a healthier lifestyle.<sup>8</sup>

The adoption of smartphones is increasing globally, and mobile phones are being replaced by smartphones. A survey released by InCrowd shows that 95% of nurses own smartphones, while 88% use gadgets including mobile health apps at their workplace.<sup>9</sup> It was predicted that there will be 1.4 billion smartphone users in the world by 2015.<sup>10</sup> Some applications of smartphones (apps) are related to health care.<sup>11</sup> Patients can use these applications to monitor their health. In addition, many health-care staffs use smartphone applications to access information.<sup>12</sup>

Recent apps provide users with various useful functions similar to those functions provided by applications available in notebooks or desktops.<sup>13</sup> Many health care-related apps are available and can be downloaded easily from well-known download sites. Among others are drug calculators, clinical references or point-of-care (POC) references, diet and/or exercise guide and calculator, electronic drug manuals, tools to analyze laboratory tests and diagnostic studies, and differential diagnosis guides.<sup>14</sup> Apps can be designed to assist health-care staffs to improve their work productivity such as providing online access to medical information, medical imaging, and laboratory results.<sup>15</sup> There are apps that allow patients to use their smartphones to monitor their health such as monitoring their heart rate, blood pressure, and emergency unit support.<sup>12</sup>

The most significant development in terms of managing health information is the introduction of e-health. One of the benefits gained by patients from e-health initiatives is more accurate treatments as various related information, including historical information, can be processed to produce more accurate diagnoses. Some benefits of e-health for health-care staffs include effective coordination across multi-professional teams, ease in managing patients' data, fast access of data/information when needed, and help in performing audit and research activity. In addition, e-health can reduce hospital admissions and emergency department visits, manage and control chronic illness easily, improve nurse utilization that has an impact on the nursing staff shortage, reduce health-care costs, and provide access to care from anywhere at anytime.<sup>16</sup>

Health-care staffs can utilize an e-health system by combining multimedia data such as audio, video, and text data into their existing practices to provide online health care.

This multimedia capability along with a body of knowledge and competencies will help health-care staffs deliver health-care services remotely. With the recent progress in Web 2.0 technology such as social media applications coupled with advances in mobile technology, patients can be empowered in controlling information flow such as accessing their EHRs, generating contents, and having conversations with health-care professionals or with other patients in a social network.<sup>17</sup> To take advantage of the recent development in mHealth, the role of health-care staffs, especially for those who provide online services, need to be redesigned. We examined the proposed role of OHE from the perspective of customer relationship management (CRM) in mHealth systems.

**Customer relationship management.** Since most patients own smartphones, extending health services that can be accessed through smartphones or mHealth services should be considered.<sup>18</sup> Mobile health services can be integrated to CRM, a tool as well as a strategy can be utilized by health-care providers in fulfilling patients' need for mobile services. A new CRM concept that includes social networks, known as Social CRM or CRM 2.0, can facilitate intensive interactions between the patients and the health-care provider and among patients themselves.<sup>19</sup> Hence, Social CRM provides various multiway interactions that can be used for information sharing or consultations with the health-care staffs through smartphones. In fact, Social CRM supports interactions in three dimensions: interactions between health-care staffs and patients, interactions among patients, and self interactions in which patients can access the mHealth system directly like inserting or editing the contents of their own personal health habits.<sup>20</sup> Social CRM enables collaborative relationships and greater control to the customers. Therefore, Social CRM highly supports information and knowledge sharing among patients.<sup>21</sup> A significant element of Social CRM for health care is patient empowerment. It offers patients to have a dynamic role in the health-care process, like allowing them to update their EHRs.<sup>22</sup> The Australian government has publicly introduced patient empowerment through Personally Controlled Electronic Health Record that allows patients to observe their medical records. Social CRM also empowers patients in managing their health care such as requesting online consultations, online appointments, or online prescriptions. Finally, Social CRM promotes health promotion and awareness through information and knowledge sharing that takes place in social media.<sup>23</sup> We have conducted user requirements analysis in Brunei and Indonesia, focusing on roles of OHE.

**Health-care system and Internet in Indonesia.** Indonesia has 34 provinces, and each province has autonomous regions called *Kabupaten* (districts) and *Kota* (cities). Health-care administration (such as human resource management, finance, information system, and service provision) is under the responsibility of autonomous regions (*Kabupaten* or *Kota*). Public health-care services are provided through community health-care



centers (*Puskesmas*) or public hospitals if the *Puskesmas* cannot handle the required services. There are more than 7000 units of *Puskesmas* across the country in provinces, districts/cities, subdistricts, and villages. Data from National Health Survey Indonesia indicate that more than 30% of the population utilizes *Puskesmas* to find basic health-care services.

The study was undertaken in Malang, the second largest city in East Java Province. We used convenience sampling and only considered the willingness of the health-care center to actively participate for system testing. Recent information indicated that Malang has more than 800,000 people with 73 health-care centers, including 16 *Puskesmas*.<sup>24</sup> As public health-care services are not sufficient to support the population, the private health-care services are growing and considered important. This is not only happening in Malang but also happening in other autonomous regions across Indonesia. Hence, extending health-care services through e-health, especially m-health, need to be considered seriously to improve public health-care services.

Social CRM is an idea developed from the advancement of the Internet, especially Web 2.0, which includes social networks. Social networks have greatly impacted the adoption of the Internet as they provide real-time interaction and multi-way communications, providing media for sharing and bonding.<sup>25</sup> The adoption of social networks in Indonesia is high, there were more than 4 million Twitter accounts in January 2011 and more than 20% of Internet users in Indonesia visited Twitter.com in June 2010.<sup>26</sup> Indonesia has the fourth largest number of Facebook users in the world. There are 44 million Facebook users in Indonesia, and the number is growing with 18.21% penetration.<sup>27</sup> In addition, rural areas in Indonesia are resilient and fast adopters of Internet technology. As a result, Internet-based services, including health-care services, has a good chance of being adopted.

**E-health in Brunei Darussalam.** Brunei has excellent health-care services, and it is constantly being improved. One of the strategic objectives of the Ministry of Health is to provide highly reputable health-care services for the nation comparable to the best services provided in the region.<sup>28</sup> Internet penetration in Brunei is high, among the highest in Asia. Latest Internet statistics from Internetworldstats.com indicate that Brunei is among the top 50 in the world in Internet Penetration. Telephone networks supporting high bandwidth communication have been upgraded through fiber optic cables. High-speed Internet connection with data transfer rates up to 150 Mbps is widely available.<sup>29</sup> Recently, home broadband plans provided by Telekom Brunei (TelBru) can support up to 300 Mbps. In Brunei, almost everyone can access the Internet either through home connections or through mobile data connections.

One large scale (country wide) e-Health initiative that has been recently implemented is Brunei Darussalam Health-care Information and Management System (BRU-HIMS). Using BRU-HIMS, all health-related data are stored in electronic form, and one patient has only one health record

stored centrally. For time being, this system mainly serves health-care professionals. It is possible to extend the system so that patients can directly interact with the system.<sup>30</sup>

## Methodology

The primary data collection was undertaken through questionnaires and narrative inquiries (Anshari & Almunawar, 2015).<sup>11</sup> Data were gathered from two places, Indonesia and Brunei. The first stage of the survey was conducted in Brunei, where the majority of the respondents were local Bruneians, who frequently visit health practitioners. In total, there were 366 respondents participating in the survey. In Indonesia, the questionnaires were fairly distributed to the groups of health-care staffs and customers (patients) who regularly visit health-care centers in Malang, East Java, and Indonesia. There were 108 respondents taking part in the survey. Participants were also interviewed in an inquiry session, where they were requested to answer a series of questions related to their understanding on interactions in the system. Data were further collected from the interview with the OHE and personal observation from all participants. The data collection period was three months from March to May 2012. Focus group discussion (FGD) was used to gather a deeper understanding of expected roles and challenges of OHE from the perspective of health-care staffs. All data gathered were processed to find expected features and services for mobile health applications and how such services can be optimally provided to patients. All subjects gave their informed consent to participate in this research.

## Data Analysis

The items of survey were classified into three sections. The first section has six items on demographic data. This includes gender, age, employment type, educational level, computer, and Internet literacy. The second section consists of important features of health-care service in mHealth. Open comments were gathered in the third section. We use the comments to explore the relationships among several variables that addressed research questions.

Characteristics of the respondents from Indonesia are shown in Table 1. More than 50% of the respondents are health-care and medical staffs. We approached health-care staffs because they are potential users of the mHealth system. It is interesting to find that ICT literacy of the respondents is rather high, moderate to advanced level, and 75% of them use the Internet on a daily basis. This indicates that there is no problem with the basic ICT knowledge and Internet access.

Table 2 shows the demographic characteristics of the respondents in Brunei. The first part of our survey gathered data on employment type, gender, age composition, living arrangements, education level, computer, and Internet literacy. Most respondents work with the government sector (58%). The rest of them (42%) work in the private sector. It reflects the employment pattern in Brunei, where more people



**Table 1.** Demographic characteristics of sample in Indonesia.

VARIABLE	COMPONENT	PERCENT
Employment	Administrative health staff	7.4
	Doctors	9.3
	Nurses	29.6
	Others	53.7
Gender	Male	27
	Female	73
Age	20 years or younger	7.4
	21–30	76
	31–40	11
	41–50	3.7
	51 years or older	1.9
Education	Completed high school	24.3
	Completed Diploma	42.12
	Completed Degree	31.8
	Completed Postgraduate	1.9
ICT Literacy	Not at all	7.4
	Basic User	17.6
	Medium User	48.1
	Advance User	26.9
Internet Usage	At least daily	75.0
	Weekly	20.4
	Monthly	1.9
	Never	2.8

work with the government for job security reasons and welfare benefits. The majority of the respondents' ages were between 21 and 30 years (38%), 19% of them between 31 and 40 years, 18% of them were between 41 and 50 years, 13% of them were 20 years or younger, and the rest of them (12%) were 51 years and above. Most respondents live with their families.

In terms of educational level, 10% of the respondents did not complete high school, 31% of them had completed only high school, and 59% have completed more than high school level. This indicates that the majority of the respondents are well educated. Regarding how frequently respondents used the Internet, either at home or at their workplace, the majority of the respondents can easily access the Internet (63%) and they use the Internet daily, 18% them use the Internet at least once a week, 9% use the Internet at least once a month, and 10% of them have never used the Internet. The respondents were also requested on their computer literacy through the frequent use of computers in their everyday lives. In all, 64% of the respondents use the computer every day, 18% of them use the computer less than daily to weekly, 9% of them use the computer weekly to monthly, and 9% of them have never used the computer at all. It demonstrates that the computer literacy in Brunei is high. This is evidently related to the Internet literacy and educational level as well.

**Table 2.** Demographic characteristics of sample in Brunei.

VARIABLE	COMPONENT	PERCENT
Employment	Government	58
	Private	42
Gender	Male	46
	Female	54
Age	20 years or younger	13
	21–30	38
	31–40	31
	41–50	18
Education	51 years or older	12
	Not completed high school	10
	Completed high school	31
	More than high school	59
Internet usage	At least daily	63
	Weekly	18
	Monthly	9
	Never	10
ICT Literacy	Advance User	64
	Medium User	18
	Basic User	9
	Not at all	9

Table 3 shows the findings of the survey, both in Brunei and Indonesia. We developed a prototype of mHealth based on the accommodating features that we found from the survey. The prototype adopts the Social CRM concept, which accommodates more complex health services featuring social networks, empowerment, and the role of OHEs (Fig. 1). The OHE

**Table 3.** Comparing survey result of samples in Indonesia and Brunei.

SURVEY RESULT	INDONESIA, 2012	BRUNEI, 2012
<b>Empowerment</b>		
• View EMR	69%	79%
• Record health activities online	75%	76%
<b>Social networks</b>		
• Discuss health service in social networks	72%	62%
• Supporting group in social networks	93%	72%
• Discuss with patients same condition	80%	76%
<b>Online health educator</b>		
• Consultation online	83%	73%
• Stand by online health educators	92%	92%
<b>Extended services</b>		
• Paying service online	39%	50%
• Emotional & spiritual affect physical	100%	N/A
• In overall, improve health literacy	64%	N/A
• In overall, improve customer satisfaction	87%	N/A

is dedicated health staff who are specifically responsible for patients at mHealth systems. They are in charge of establishing relationships, communication, education, and consultation with the patients.

When we asked respondents on the need of OHE in mHealth services, majority of them share the same opinion; they agreed (83% strongly agree and 73% agree) that the presence of OHE would enable them to make online consultation through their mHealth systems. We then asked respondents regarding the time required for the OHE to answer queries from patients in mHealth setting, 92% of respondents either in Brunei or Indonesia strongly support the idea of a standby OHE (immediate response). The presence of an OHE in an mHealth system is expected to provide quick responses and ensure reliability and quality of services. Furthermore, we investigated patients' preference whether they are willing to pay for mHealth service supported with an OHE. The result shows that respondents were unlikely to agree to paying for OHE services in Indonesia (39%), while half of respondents (50%) in Brunei agreed to pay for the service.

In this study, we also used a *t*-test that compared the mean between samples in Indonesia and Brunei (Table 4) for consultation online service through e-health. The result is

**Table 4.** Comparing consultation online of samples in Indonesia and Brunei.

	MEANS	STANDARD DEVIATION
Indonesia	1.85	0.67
Brunei Darussalam	2.01	0.75

considered to be statistically significant ( $P = 0.0497$ ), which means that there are some significant differences in terms of expectation of online services between Bruneians and Indonesians involved in the survey.

## Discussion

This study revealed the tendency of changes in the patients' behavior in terms of interaction and empowerment. mHealth with Social CRM supports patients to have conversations, information sharing, and interactions with all sectors in the system anywhere and anytime.<sup>31</sup> Consider the following scenario: patients who have similar diabetes issues will get many benefits from the availability of social interactions in their mHealth system that enables them to share knowledge and experiences and support one another.

The study proposed complex mHealth services featuring social networks, empowerment, and participation. In order to ensure that the mHealth effectively runs, an extended role for health-care professionals who specifically look after the service is required. Results from the FGD with health-care staffs who participated in the survey indicate that the factors that affect mHealth services are promoting support, quality of service, and quality of information. OHE has the responsibility to ensure these factors for patient care in mHealth.

**Health promotion.** Health promotion in mHealth ranges from educating patients and families about health and health care, providing advice and support to patients, facilitating communication between health-care staffs and patients, explaining patients' health-care histories and symptoms, assisting them to perform diagnostic tests and analyze results, administering treatment and medications, and helping with follow-up. OHE plays a key role in mHealth because they provide counseling for participants who seek advice about any medical and health matters. The interaction enables the system to operate in various processes in supervising care and assistance. The guidance from OHE helps participants understand the sort of procedures they can expect in reasonable response time, information about their health on treatment, prevention, or questions about medicines while they are away from the health-care center. OHE can take appropriate actions or advice to contain any disease outbreak, limit exposure, and prevention.

**Quality of service and information quality.** mHealth promotes patients' empowerment. The role of OHE is needed because OHE will ensure the high quality of online services. Patients try to find information with the intention to seek



**Figure 1.** Screenshot of mHealth.



instant answers for their health-care concerns, and they expect prompt response through their mobile devices. Therefore, it is important for OHE to make sure that services are well presented anytime, anywhere as the nature of mobile services. The quality of service (QoS) in mHealth refers to several related aspects such as how easy it is to make an appointment, how regular health information is updated, how easy it is to have discussions with OHE, and how system reminders for patients work in their smart mobile devices. QoS in this context is a set of procedures for managing patients' responses in an effective manner to enhance the user experience from mHealth services. Furthermore, providing information quality (InfQ) in mHealth services is the objectives of OHE. Patients are empowered to generate the contents of health-cares. Empowering patients in mHealth may include longitudinal health information, which is convenient for patients that they will not have to repeat similar information. OHE ensures that information entered into the system is reliable to remove inaccuracies or misinterpretations.

The nature of the mobile service provides a sense of anonymity, and the lack of physical interaction provides a false sense of security. Therefore, OHE is significant in determining and controlling the reliability of information. InfQ is a mechanism that is needed to make sure the content of information conveyed to patients is useful and reliable. OHE has to certify and guarantee that the contents and information given in the business process of mHealth are reliable. There are risks with inaccurate medical information or health-care data because it deals with health and health-care matters. Therefore, OHE must assure and confirm the accuracy and validity of information.

In summary, the presence of OHE determines the key success of mHealth system. When patients interact through mHealth, they expect to receive quick feedbacks or suggestions from OHE. It is similar to the customer's request in traditional CRM that assists customers through phone calls. Delaying request from mHealth could discourage patients from trusting the service.

**Security and privacy.** Security and privacy are the main concerns in any mHealth implementation. In fact, many patients hesitate to adhere to using the service due to their concerns regarding security and privacy. However, the need for interconnectivity and accessibility is strong, and the laws governing access to personal health information protect individuals and make mHealth challenging from the technical, organizational, and legal perspectives. However, the advantages offered by e-empowerment are promising such as involving customers in the health-care process, increasing efficiency in managerial tasks, and improving health awareness or health literacy of users. There is no doubt that all health-care professionals must uphold confidentiality of their patients' data. Consequently, the system has to meet requirements for maximum security, sufficient privileges for users to fulfill their respective tasks, and easy user maintenance. Implementing a client/server environment over the Internet provides great flexibility.

## Conclusion

A patient-centric paradigm views that patients are seen as partners in the health-care process. However, many worry about the InfQ and reliability of mHealth services. This issue can be addressed by assigning OHE to ensure that information flow is reliable. OHE extends the role of patients in mHealth service from recipients of health care to partners in the process. OHE should be considered to support the idea of patients as partners of health care and that they should be empowered in the whole mHealth cycle. OHE can be a team from diverse expertise that consists of health-care staffs, medical professionals, and clinical officers. There are challenges related to the work of OHE. These challenges are the comprehensive roles of OHE as promoting health through mHealth's tools, ensuring quality of health-care services, and most importantly guarantee that the quality of information in mHealth is reliable. In conclusion, OHE brings many new opportunities to build a climate of trusted relationships, assure high quality information, and better online services for online patients anywhere and anytime.

## Author Contributions

Conceived and designed the experiments: MA, MN. Analyzed the data: MA. Wrote the first draft of the manuscript: MA, MN. Contributed to the writing of the manuscript: MA, MN. Agree with manuscript results and conclusions: MA, MN. Jointly developed the structure and arguments for the paper: MA, MN. Made critical revisions and approved final version: MA, MN. Both authors reviewed and approved of the final manuscript.

## REFERENCES

- Goeschel CA, Wachter RM, Pronovost PJ. Responsibility for quality improvement and patient safety: hospital board and medical staff leadership challenges. *Chest*. 2010;138(1):171–8.
- Haux R, Ammenwerth E, Herzog W, Knaup P. Health care in the information society. A prognosis for the year 2013. *Int J Med Inform*. 2002;66(1):3–21.
- Chattopadhyay S. A framework for studying perceptions of rural healthcare staff and basic ICT support for e-health use: an Indian experience. *Telemed J E Health*. 2010;16(1):80–8.
- CNA. *Telehealth: The Role of the Nurse*. Canadian Nurses Association Publication, Ottawa, Canada; 2007.
- Lau SL, König I, David K, Parandian B, Carius-Düssel C, Schultz M. Supporting patient monitoring using activity recognition with a smartphone. In: 7th international symposium on Wireless Communication Systems (ISWCS), IEEE, York, UK; 2010:810–4.
- Luxton DD, McCann RA, Bush NE, Mishkind MC, Reger GM. mHealth for mental health: integrating smartphone technology in behavioral healthcare. *Prof Psychol Res Pract*. 2011;42(6):505.
- Anshari M, Almunawar MN. Tracking future path of consumers' empowerment in E-health systems. *Int J E Health Med Commun*. 2015;6(3):63–76.
- RCN. *Putting Information at the Heart of Nursing Care-How IT is Revolutionising Health Care*. Learning Development Institute Royal College of Nursing, London, UK; 2012.
- mhealthintelligence. 88% of Nurses Profit from Mobile Health Apps Smartphones. Available at: <http://itelemedicine.com/news/mobile-health-apps-smartphones/>. Accessed 24 January, 2016.
- IDC. Worldwide Smartphone Growth Forecast to Slow from a Boil to a Simmer as Prices Drop and Markets Mature. Available at: <http://www.idc.com/getdoc.jsp?containerId=prUS25282214>. Massachusetts, USA. Accessed June 29, 2015.
- Anshari M, Almunawar MN. Designing role of online health educators in healthcare services. *J Evid Inf Soc Work*. 2015;12(2):220–36.



12. Holloway K. Smartphones, eHealth and Nursing; 2011. Available at: <http://www.nursingreview.co.nz/pages/section/article.php?s=Webscope&idArticle=22869>. Accessed November 9, 2012.
13. Anshari M, Alas Y, Guan LS. Pervasive knowledge, social networks, and cloud computing: E-learning 2.0. *Eurasia J Math Sci Technol Educ*. 2015;11(5):909–21.
14. Innocent K. Mobile apps for nurses. *Nursing2014 Critical Care*. 2010;5(5):45–7.
15. Nursingreview. Smartphone and E-Health. Available at: <http://www.nursingreview.co.nz/issue/december-2011/smartphones-ehealth-and-nursing/>. Accessed June 29, 2015.
16. Case J, Mowry MM, Welebob E. *The Nursing Shortage: Can Technology Help?*. The Foundation; 2002.
17. Anshari M, Almunawar MN. Evaluating CRM Implementation in Healthcare Organization. In: Proceedings of 2011 International Conference on Economics and Business Information. IPEDR, IACSIT Press; Bangkok, Thailand; 2011, Vol. 9, 30–4.
18. Anshari M, Alas Y. Smartphones habits, necessities, and big data challenges. *J High Technol Manage Res*. 2015;26(2):177–85.
19. Anshari M, Almunwar MN, Wint Z, Low PKC, Younis M. Adopting customers' empowerment and social networks to encourage participation in E-health services. *J Health Care Finance*. 2013;40(2):17–41. [Aspen Publishers].
20. Almunawar MN, Anshari M. Empowering customers in electronic health (e-health) through social customer relationship management. *Int J Electron Customer Relat Manage*. 2014;8(1):87–100.
21. Low KCP, Anshari M. Incorporating social customer relationship management in negotiation. *Int J Electron Customer Relat Manage*. 2013;7(3):239–52.
22. Anshari M, Almunawar MN, Low PKC, Al-Mudimigh AS. Empowering clients through E-health in healthcare services: case Brunei. *Int Q Community Health Educ*. 2013;33(2):191–221.
23. Anshari M, Almunawar MN, Low PKC, Wint Z. Customer empowerment in healthcare organisations through CRM 2.0: survey results from Brunei tracking a future path in E-health research. *Aus J South East Asian Stud*. 2012;5(1):139–51.
24. Sukarelawati E. Jumlah RS di Kota Malang Tidak Seimbang. Available at: <http://jatim.antaranews.com/lihat/berita/74707/jumlah-rs-di-kota-malang-tidak-seimbang>. Accessed September 18, 2012.
25. Thia T. Social media most evolved in Singapore. Available at: <http://www.zdnetasia.com/social-media-most-evolved-in-s-pore-62206580.htm>. Accessed September 18, 2012.
26. Comscore. Indonesia, Brazil and Venezuela Lead Global Surge in Twitter Usage. Available at: [http://www.comscore.com/Press\\_Events/Press\\_Releases/2010/8/Indonesia\\_Brazil\\_and\\_Venezuela\\_Lead\\_Global\\_Surge\\_in\\_Twitter\\_Usage?utm\\_source=feedburner&utm\\_medium=feed&utm\\_campaign=Feed:+comscore+%28comScore+Networks%29](http://www.comscore.com/Press_Events/Press_Releases/2010/8/Indonesia_Brazil_and_Venezuela_Lead_Global_Surge_in_Twitter_Usage?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+comscore+%28comScore+Networks%29). Accessed September 18, 2012.
27. Socialbakers. Indonesia Facebook Statistics. Available at: <http://www.socialbakers.com/facebook-statistics/indonesia>. Accessed September 18, 2012.
28. Rahman K. Ministry signs E-Health contract, Brunei Direct. Available at: <http://www.brudirect.com/DailyInfo/News/Archive/May07/030507/nite17.htm>. Accessed September 18, 2012.
29. Abu Bakar A. High-speed broadband soon. *The Brunei Times*. 2011;4:A1–2 (361).
30. Symey Y, Sankaranarayanan S, binti Sait SN. Application of smart technologies for mobile patient appointment system. *Int J*. 2013;2(4).
31. Almunawar MN, Wint Z, Low KCP, Anshari M. Customer's expectation of E-health systems in Brunei. *J Health Care Finance*. 2012;38(4):36–49. [Aspen Publishers].



## Appendix

**The survey questionnaire.** Please give your completed paper survey to your survey liaison. Thank you again. We appreciate your time and your participation.

*We assure you that every effort has been taken to make sure that your answers are confidential and cannot be linked back to you. Please answer honestly*

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Employment: ( ) Government ( ) Private  
(Choose one)

### I. Demographics

#### 1. What is your gender? (Check one)

- \_\_\_\_ Male  
\_\_\_\_ Female

#### 2. What is your age? (Check one)

- \_\_\_\_ 20 years or younger  
\_\_\_\_ From 21 up to 30 years  
\_\_\_\_ From 31 up to 40 years  
\_\_\_\_ From 41 up to 50 years  
\_\_\_\_ 51 years or older

#### 3. Living arrangements? (Check one)

- \_\_\_\_ Alone  
\_\_\_\_ Family  
\_\_\_\_ Other

#### 4. Level of education? (Check one)

- \_\_\_\_ Did not complete high school  
\_\_\_\_ Completed high school only  
\_\_\_\_ Completed more than high school

#### 5. Frequency of the Internet use at home or in workplace? (Check one)

- \_\_\_\_ At least daily  
\_\_\_\_ < daily to weekly  
\_\_\_\_ Weekly to monthly  
\_\_\_\_ Never

#### 6. Computer use frequency? (Check one)

- \_\_\_\_ At least daily  
\_\_\_\_ < daily to weekly  
\_\_\_\_ Weekly to monthly  
\_\_\_\_ Never

### II. Theme A: Ability of E-Health to provide information accessible to patient online

#### 7. I can request appointment online? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 8. I want to view and control my medical records online? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 9. I can make a change or update my medical record online? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 10. I can request refills for prescriptions online? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 11. I can request referral online? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 12. I can view my total payments and insurance covered (if any) online? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 13. I can view and interact/update to my personalized health promotion program online? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 14. I agree to pay for any online services provided? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 15. I can use ICT (email, chat, VoIP, etc) to communicate or consult my health status with health promoter/health educator? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 16. I can discuss and share anything related to health services from hospital with others (friends/relative in social networks)? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

#### 17. I can log and record my health related activities online? (Check one)

- \_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree



18. **I want to have control with whom I can share my online medical records even doctors from different healthcare providers? (Check one)**  
\_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree
19. **My health information should only be known to my trusted/family doctor and me? (Check one)**  
\_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree
20. **I want to discuss my health condition that I view from my online medical records with my friends in social networks? (Check one)**  
\_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree
21. **I want to get in touch with other patients who have the same condition online? (Check one)**  
\_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree
22. **I will use Social networks/support online group provided by healthcare provider to get information as much as possible? (Check one)**  
\_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree
23. **I do not want government agencies/research center/laboratories/universities access my medical records even for research? (Check one)**  
\_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree
24. **I do not want pharmaceutical/insurance company/medical business entities to have access my medical records? (Check one)**  
\_\_\_\_ Strongly Agree  
\_\_\_\_ Agree  
\_\_\_\_ Disagree  
\_\_\_\_ Strongly Disagree

**Theme B: Please feel free to comments your expectation about E-Health systems and its accessibility in order us having better knowledge our health status.**