ORIGINAL RESEARCH

IMPROVING HEALTCARE SERVICES USING MOBILE TECHNOLOGY: NEEDS AND EXPECTATION ASSESSMENT FOR THE DEVELOPMENT OF MOBILE HEALTH APPS FOR MENTAL HEALTH SERVICES IN TECHNOLOGY

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ABSTRACT	Keywords
The number of electronic health applications is increasing, including those that can be used for mental health. Previous studies showed that, use of several applications provides great benefits for mental health and greatly increases accessibility to mental health services. The objectives of this study were to assess needs and expectations of patients with mental disorder and a broad group of stakeholders with the expected end product being a well-functioning user-centered technology-based tool for mental disorders. The research was carried out by involving 80 patients with schizophrenia and 74 family's caregivers in health services and local offices of health services in five cities of Indonesian capital city, Jakarta. This study was conducted through self-administered questionnaires from December 2017 to July 2018. A descriptive statistic using proportion was used to present the data. The results indicated that patients needed information relevant to disease, patient care, check-up schedules and consultation with health workers. In addition, patients also wanted to get information on job vacancies due to many of them were unemployed and rehabilitation programs carried out by local health services. This study highlighted the needs to develop a mobile-based application for continuity of mental health services in the community.	**Caregivers, Mental Health, Mobile App, Mobile Medical Education, Technology**

INTRODUCTION

Mental health problems are a major public health issues worldwide and accounted for 8.5% of premature death and disability (Murray et al., 2015) . Around 6.1%-9.8% of Indonesians suffer from mental disorders such as schizoprehnia, depression, and other emotional problems (Ministry of Health of Republic of Indonesia, 2018). However, the majority of mental disorders receives less attention or undertreatment, particularly in developing countries, such as Indonesia, only 9%

receive a treatment for their mental health problems (Ministry of Health of Republic of Indonesia, 2018). The main reasons for lack of treatment for mental health problems were lack of awareness about mental health, stigma related to mental illness that affected the health seeking behaviour, lack of appropriate mental health services and shortage of trained mental health professionals (Thornicroft et al., 2009; world health organization, 2001). These conditions are more severe in rural populations (Armstrong et al., 2005),

especially in regions with particularly poor infrastructure and resources for health care delivery in general, with almost no capacity for providing mental health care.

The evolution of the Internet as a worldwide connectivity tool has become the key to information and communication technology. By taking advantage of this opportunity, people have designed platforms that make it possible to share information and interactions between professionals. Nowadays, it's not only used for business but also in healthcare systems for prevention, care or curative, and rehabilitation. The number of electronic health applications is increasing, including those that can be used for mental health (Bakker & Kazantzis, 2016).Previous studies have shown that the use of several applications provides great benefits for mental health and greatly increases accessibility to mental health services (Research Guidance, 2016). A meta-analysis study reports that mobile-apps for mental health showed a positive effects on symptoms of depression, anxiety, and other mental health conditions (Donker et al., 2013). Utilization of digital technology, including mobile applications could reduce the healthcare cost, improve the relationship between patients and family with healthcare professional , resolve geographical barrier, and reduce stigma in mental health services (Firth et al., 2017). With the increase of computer literacy and medical knowledge available on the internet in the world, health care professionals must be well prepared to cope with changing patient behaviors and knowledge (mental health commision of canada, 2014).

Unfortunately, the development of information and communication technology cannot be utilized in many low and middle income countries, such as Indonesia, even though the demand for patients and medical practices continues to increase. Although a large number of technology-based tools are widely available, most of them are not adapted to local settings and users have not been consulted for the development of tools (Bridges et al., 2011). A previous study has shown that some applications lack documentation, or do not meet user privacy and security expectations. In Indonesia, the implementation of Telehealth or Telenursing is not considered optimal yet since there are a small number of health practitioners providing consultation and information to patients by phone or facsimile machines (Hariyati & Sahar, 2012).

Within this background, we argue that a user-centered improvement strategy is wanted to make certain that mobile health apps developments are relevant and useful, particularly for sufferers with mental illness and for household caregivers. A variety of equipment is designed to tackle specific challenges and in order to reach their expectation they have to match with the expectations of the users whilst being without usability problems (Hoyt et al., 2013). Efficacy, satisfaction, and effectiveness are key elements of the usability of technology-based equipment and these factors have to be fulfilled for tools to be tailor-made to meet the needs of users, mainly in mental health fields (Agha et al., 2013). Potential user necessities need to be the fundamental focus for cellular software interface design, especially in clinical education. Required interface elements need to dominate the design of the rest of the system (Peck et al., 2000). However, until now in Indonesia there is no specific cellular application for patients with mental disorders or families caregiver. In addition, instructions and directions regarding the use of the application are not yet available. Therefore, in order to develop a useful mobile apps, it is important to determine the needs of patients, health care providers, family caregivers, volunteers and the nature, characteristics, and content of the current mobile apps (Kaplan, H.I. & Sadock, 2010).

In this regard, this study was conducted in the Indonesian capital city as part of project of Telenursing Me-Co Care for mental health care. This project used task shifting that was supported by a mobile technology based mental health services delivery model for health education, managing and rehabilitation of patients with mental disorders. The main objective of this study was to assess the needs and expectations of patients with mental disorders and a broad group of stakeholder

with the expected end product being a well-functioning user-centered technology-based tool for mental disorders.

METHOD

The needs and expectation assessment was conducted in collaboration with a team from the department of nursing and engineering of Universitas Muhammadiyah Jakarta, Indonesia. This study was conducted through self-administered questionnaires where possible from December 2017 to July 2018.

Settings and sample

The research involved the Health Services and Local Offices of health services in five cities of Indonesian capital city, Jakarta, including Central Jakarta, East Jakarta, North Jakarta, West Jakarta, and South Jakarta. For reasons of efficiency in collecting users' requirements, we selected a participants including 80 patients with mental disorders confirmed from their medical records and age above 20 years old, 74 family members who live with a patient with mental disorders and have role as a decision maker in their family. A convenience sampling technique was used in this study.

The data were collected using questionnaires self-developed by the research team through an extensive literature search and expert review. After the calculation, the mean item content validity index (I-CVI) was .705 and In the current study, alpha coefficient showed acceptable internal reliability (α = .675). Participants fill out the questionnaire by checking the "Yes or No" box. The questionnaire was asked the information about the disease and treatment, call center, job opportunity information, health information, and consultation, insurance procedures, perspectives on availability of medical information, and updates potentially provided via mobile-based technology. The questionnaire was analyzed per item for the frequency.

Ethical considerations

This approval was received from the Independent Review Committee of affiliated university (079/KEPK/UMJ/III/2019). Informed written consent was obtained from all participants and data were collected according to the Declaration of Helsinki on ethical research. Approval for conducting the project was obtained from all the local administrations.

Data analysis

All data were cleaned by the data management team. Most of the coding was predefined at the time of developing the electronic data capture tools by the software developers in consultation with the researchers. A descriptive statistic using proportion was used to present the data.

RESULTS

About 36.2% of patients with schizophrenia were ages from 26-35 years old. The majority of respondents were males (65.5%) and graduated from senior high school (61.2%). The majority of family caregivers were ages from 46-55 (35.1%) and females (78.3%) with low education (graduated from elementary school) (78.3%). 47.3% of family caregivers were the patient's biological mothers (Table 1).

Around 83.7 answered that patients know about their disease and 100% family caregivers know their family disease diagnosis. The majority of patients diagnosed with hallucination (86.2%) as perceived by the patients but from family caregivers' perspective, 87.8% perceived the disease is associated with a previous history of disease in family (Table 2). About one third of the patients had stopped taking a medication due to lazy to make medicine (39.3%), followed by bored and forgot to take medicine (17.8%) (Table 3). About 80% public health service provided care for patients with mental health disorders and majority of the patients perceived satisfaction with the quality of care delivered (Table 4).

Table 5 describes the content needed on the mobile app based on patients' perspectives. About 91.2% needed

rehabilitation program, 68.7% perceived need of job vacancy information, 63.7% needed rehabilitation activities in their environment, 61.6% needed a platform for consultation online, especially which relevant to follow up schedule. Patients also required the information about the disease and medicine that they took routinely.

Base on the family caregiver's perspective, they need the information about call center, information about the insurance. Around 75.6% of caregivers choose to go to health service center as a response to the patients' recurrences. However, 74.3% of participant knew about the availability of call center and with the majority of them (67.2%) frequently contacted the call center of local government clinic.

Table 1. Demographic characteristics of studied participants

Variable	Patients (n=80)		Caregivers (n=78)	
	n	%	n	%
Age (years)				
13-16	1	1.2	-	-
17-25	11	13.7	1	1.3
26-35	29	36.2	4	5.4
36-45	22	27.5	14	18.9
46-55	14	17.5	26	35.1
56-65	3	3.7	19	25.6
>65	-	-	10	13.5
Gender				
Male	50	62.5	16	21.6
Female	30	37.5	58	78.3
Education level				
No formal education	-	-	4	5.4
Elementary School	11	13.7	24	32.4
Junior High School	14	17.5	16	21.6
Senior High School	49	61.2	24	32.4
Higher Education Institute/Collage	6	7.5	6	8.1

Table 2. Frequency Distribution Based on Patients' Health History

Variable	Patients' perspective (n=80)		Caregivers' perspective (n=78)	
	n	%	n	%
Knowing about the diseases	67	83.7	74	100
Yes	13	16.2		
No				
Type of disease				
Family Medical History	3	3.7	65	87.8
	69	86.2	2	2.7
Hallucination	3	3.7	2	2.7
Social isolation	2	2.5	4	5.4
Low Self-esteem	3	3.7	1	1.3
Suspicion				

Table 3. Frequency Distribution Based on Medical Treatment Record (n=80)

Variable	n	%
Stop taking the medicines	28	35.0
Yes	52	65.0
No		
Reason of stop taking the medicines:	4	17.8
Bored	1	3.6
Wanted to free from the medicines	2	7.1
	11	39.3
Medicines ran out	2	7.1
Lazy to take medicine	5	17.8
Far from home	3	10.7
Forgot to take the medicines		
nausea		

Table 4. Availability of health care services for mental disorders (n=80)

Variable	n	%
Availability of health services in the region	-	-
Yes	80	100
No		
Health service quality		
Poor	3	3.7
Sufficiently satisfactory	41	51.2
Satisfactory	36	45.0
Availability of online health services:	64	80.0
Yes	16	20.0
None		

Table 5. Content needs on the Online Mental Health Service Application based on patients' perspective (n=80)

Variable	n	%
Need for Job Information	55	68.7
Expectation of the type of work needed	8	10.0
Motorcycle/taxi driver	3	3.7
Tailor	10	12.2
workshop	4	5.0
salon	6	7.5
cleaning service	4	5.0
laborer	2	2.5
housemaid	18	22.5
others		
Ever been rehabilitated	17	21.2
Need for rehabilitation activities in the environment	51	63.7
Need for a consultation program	73	91.2
Information required from consultants:	45	61.6
Check-up Schedule	17	23.2
Taking medicine schedule	7	9.5
Rehabilitation schedule	4	5.4
Treatment schedule		
Required for online mental health:	15	20.5
Information on medicines	18	24.6
Information on illness	2	2.7
Information on health insurance	10	13.6
Treatment record/history	21	28.7
Control schedule	6	8.2
Rehabilitation schedule	3	4.1
The latest control		

Table 6. Content needs on the Online Mental Health Service Application based on caregivers' perspective (n=78)

Variable	n	%
Families' response in facing recurrences	9	12.1
Reporting to Head of Neighborhood Unit	56	75.6
Go to a health service center	9	12.1
Others		
Availability of a call center	55	74.3
Call centers frequently contacted	6	11.0
Cadre	37	67.2
Local government clinic	9	16.3
Health worker	2	3.6
Police	1	1.8
Nearest family member		
Knowledge of the use of health insurance	72	97.2
Know	2	2.7
Do not know		

DISCUSSION

This study highlighted the need of patients with schizophrenia about their self-management including disease-related information, consultation, medication, and rehabilitation activities. One of the goals for the future smartphone application is to provide information on disease in general and to cope with disease-related medicines and relapses. Participants also expect the application to provide an information to increase their knowledge and awareness about coping with the disease burden in everyday life, which is often impaired by common myths and rumors. Previous study reported that patients with knowledge deficits or low health literacy are expected to benefit most from mHealth interventions (Whitehead & Seaton, 2016). Previous study reported that the use of mobile–based technology could increase the proportion of mental health services use by individuals who were suffering from mental health disorders. Therefore, future studies need to address the health literacy among patients with schizophrenia and family caregivers.

Participants wish for an application feature that offers specific information on rehabilitation and job vacancies with certain skills such as transportation services, cleaning services etc. This study showed that to develop mobile application for mental health need a comprehensive content that not only focus on disease-specific information but also information related to social and environmental aspects. Thoughtful mHealth research will help create resources that can have a huge impact on the lives of people coping with problems of mental health. Yet conducting mHealth research with mobile phones is complex, need to consider how to translate clinic intervention to mobile-based intervention design and delivery strategies, taking into account consumer population preferences and deployment environment.

Our study reported that family care givers had good knowledge regarding the illness of their family members. With respect to the mobile-based application that was going to be developed, the family needed information on the disease and early treatment when the patient experienced

recurrence, information on relevant call centers, and information on health insurances. However, the data collected was limited to the implementation of health programs relevant to patients with mental disorders. The number of public health services provided for mental disorders is still limited. Although the government have developed the mental health program, namely Community Mental Health Nursing (CMHN), not implemented in all region of Indonesia yet (Ministry of Health of Republic of Indonesia, 2013). The activities of CMHN included the use of basic concepts of community mental health nursing, implementation of nursing care, implementation of evaluation recording, reporting and monitoring, and empowerments of mental health cadres. The results of the research particularly showed that CMHN programs were not or have not been implemented yet in the territory of Central Jakarta. This happened due to the lack of publicity of CMHN programs, the limited resources and supporting facilities of the CMHN program in DKI Jakarta.

CONCLUSIONS

In conlusion, this study informed the needs and expectation of patients with schizophrenia and family caregivers for developing a mobile application for mental health services in Indonesia. Findings showed that patients with schizoprenia need information related to the disease, medication therapy, clinical visit schedules and consultation with health workers, job vacancies, and rehabilitation programs implemented by local health services. Future study is also needed to explore the literacy of patients and family caregivers about usability of technology in healthcare services.

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