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Application of m-health discharge planning to optimize the hospital discharge readiness for patients with acute myocardial infarction

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Abstract
Acute myocardial infarction is a disease that has a high readmission rate. Discharge planning is the key to the quality of hospitalization related to patient's readiness for hospital discharge which can prevent readmission. Unfortunately, many reported that discharge planning was still not optimal because of the use of inappropriate methods. This research proposed a new discharge planning method, namely m-health discharge planning. The aim of this study was to prove the application of m-health discharge planning in optimizing hospital discharge readiness in patients with acute myocardial infarction. The research methods used were quasi-experimental with pre-test and post-test non-equivalent control group design with 15 respondents as the intervention group and 15 respondents as the control group. This research was conducted in a general hospital in Surakarta City, Indonesia. The application of m-health discharge planning was packaged in an Android-based application and carried out in stages starting from assessment, management, monitoring, and evaluation. Hospital discharge readiness was measured using the readiness of hospital discharge scale (RHDS) questionnaire. Data analysis was performed using the Wilcoxon test and the independent T-test. The results of this study indicate that there was an effect of the application of m-health discharge planning on the readiness of hospital discharge of acute myocardial infarction patients with a p-value of 0.000. The average value of hospital discharge readiness for m-health discharge planning patients was above the normal value, while in the control group it was below the normal value. The implementation of m-health discharge planning has proven to be able to optimize the hospital discharge of acute myocardial infarction patients. This intervention can be used as a new alternative in the implementation of discharge planning methods.

Keywords: acute myocardial infarct, discharge planning, mobile health, discharge readiness

1. Introduction
Acute myocardial infarction is a disease that is progressive and has a high morbidity and mortality rate worldwide [1]. Based on the report of the World Health Organization (WHO) in 2008, acute myocardial infarction was the main cause of death in the world with as much as 7.25 million deaths. In 2013, as many as 337,252 people in Central Java Province, Indonesia had myocardial infarction symptoms [2, 3]. The high mortality and morbidity rates are due to the high risk of recurrent myocardial infarction.

The high incidence of recurrent myocardial infarction was caused by a lack of knowledge and skills of patients with acute myocardial infarction in modifying risk factors [4, 5]. In general, risk factors for recurrent myocardial infarction consist of non-modifiable risk factors and modifiable risk factors. Modifiable risk factors are the main factor causing recurrent myocardial infarction. This occurs because patients or families were unable to carry out the continuity of care, such as treatment therapy, dietary restrictions, physical activity training, control schedules, or not being able to recognize symptoms of recurrence. The impact is the increased risk of complications and the occurrence of readmission.

Discharge planning is a health service process that involves patients and families in preparing for hospital discharge so that patients' health status can be maintained. The optimal discharge planning can provide benefits to the length of treatment, reduce treatment costs, and reduce the incidence of readmission [6]. But unfortunately, at this time many reported that the implementation of discharge planning was not optimal. Inappropriate methods and inactivity of the professionals were the main factors causing the failure of discharge planning [7].

In Indonesia, the implementation of discharge planning is generally given on the discharge day. The process is in the form of providing information consisting of patients' demographic data, evaluation, advice on the patients' discharge time such as a diet that must be met and avoided, activities carried out at home, patient control schedules, and notes about patients' medicines. Information that is only given on the discharge day cannot be said to be the provision of health education and is not considered as an effective discharge planning. Besides, the implementation is also not structured hospital discharge readiness cannot be guaranteed.

Therefore, the researchers tried to develop a new discharge planning method packaged in an Android-based application, namely "m-Health Discharge Planning". M-Health is a health service in the form of applications that use mobile phone devices [8]. Given the function of mobile phones, health information can be provided in a more effective and efficient way. Users can also access health information needed at any time comfortably [9, 10]. Health programs that utilize information technology have proven to reduce costs and energy [11, 12]. M-Health Discharge planning is also a combination of the previous discharge planning method. The

purpose of this study was to prove the application of m-health discharge planning in optimizing hospital discharge readiness in patients with acute myocardial infarction.

2. Materials and methods

This study used queasy experimental with pre-test and post-test non-equivalent control group design. Research subjects were 30 acute myocardial infarction patients who were treated at a general hospital in Surakarta City, Indonesia during March-April 2018. Research subjects were divided into two groups: 15 respondents as the control group and 15 respondents as the intervention group. The control group was given traditional discharge planning while the intervention group was given m-health discharge planning. The independent variables of this study were the intervention group and the control group. The dependent variable was hospital discharge readiness which was measured using the Readiness of Hospital Discharge Scale (RHDS) questionnaire.

Assessment of hospital discharge readiness was carried out on the day of discharge and on the day when the patient went control to the hospital for the first time. The number of questions in the RHDS questionnaire was 21 items, with a total score of 1-210. The higher the score, the better the readiness of the patients'. The patient was said to be ready when the patient had a minimum score of 124.

The control group was given a booklet as a media for discharge planning. The intervention group was carried out in stages and structured using m-health discharge planning. M-health discharge planning has four main features, namely the assessment, management, monitoring, and evaluation features. There are 4 stages in the management feature where each stage contains material about the acute myocardial infarction management program.

The statistical analysis used in the study was the t-test and Wilcoxon test. The independent T-test was used to evaluate the difference in the value of hospital discharge readiness between the control and intervention groups. Wilcoxon test was used to evaluate differences in the value of hospital discharge readiness in each group.

3. Results & discussion

Mean value of hospital discharge readiness for the control group is given in Table 1. Table 1 shows that the value of hospital discharge readiness in the traditional discharge planning group had increased, but this value had not reached the normal value of hospital discharge readiness. Table 2 shows that Android-based m-health discharge planning could improve patients' hospital discharge readiness optimally. Optimal hospital discharge readiness was supported by an increase in the value of the four components of hospital discharge readiness.

Table 1: Mean Value of Hospital Discharge Readiness in Traditional Discharge Planning (Control) Group

Hospital Discharge Readiness	Mean before Discharge Planning	Mean after Discharge Planning
Hospital Discharge Readiness	106.93±6.08	114.73±5.84
Personal status	33.33±6.79	34.07±5.31
Knowledge	34.87±5.31	39.80±3.39
Coping ability	24.86±7.81	26.07±6.35
Support	13.87±2.69	9.80±1.93

Table 2: Mean Value of Hospital Discharge Readiness in M-Health Discharge Planning (Intervention) Group

Hospital Discharge Readiness	Mean before Discharge Planning	Mean after Discharge Planning
Hospital Discharge Readiness	111.53±8.89	134.80±13.65
Personal status	40.93±5.71	52.27±8.95
Knowledge	38.20±6.25	46.80±6.40
Coping ability	21.27±5.67	22.20±4.72
Support	11.13±1.69	13.53±2.50

Table 3 shows the results of statistical analysis. Based on Table 3, there was a significant difference in hospital discharge readiness values before and after the application of traditional discharge planning and m-Health discharge planning. This is evidenced by the p-value of the independent unpaired t-test of 0.000. The average value of hospital discharge readiness for the m-health discharge planning group is 3 times higher than the traditional discharge planning.

Table 3: Statistics Analysis of Hospital Discharge Readiness

Group	Mean before Discharge Planning	Mean after Discharge Planning	Mean Difference	p-value
Traditional discharge planning	106.93±6.09	114.73±5.85	15.46	0.000*
M-Health discharge planning	111.53±8.89	134.80±13.65		0.001**

*Unpaired t-test, p-value≤0.05

**Wilcoxon test, p-value≤0,05

Table 3 shows that traditional discharge planning had a significant difference in hospital discharge readiness value before and after the treatment, even though the hospital discharge readiness value obtained had not been able to exceed the normal value limit. It could be concluded that traditional discharge planning had not been able to optimize patients' readiness. The inability to achieve normal value limit in the traditional discharge planning group was due to a slight increase in all components of hospital discharge readiness. There was even one component that experienced a decrease, which was the support component.

Table 3 also shows that M-Health discharge planning had a significant difference in hospital discharge readiness value. The mean value of hospital discharge readiness for m-health discharge planning was also 3 times higher than that of traditional discharge planning. This shows that m-health discharge planning was proven to be able to optimize the patients' hospital discharge readiness. The application of m-

health discharge planning could optimize the patients' hospital discharge readiness because m-health discharge planning was a new method in discharge planning that combined several previous discharge plannings and was packaged in an Android-based application.

Going home or hospital discharge, in this case, was interpreted by increasing the ability and desire to carry out the continuity of care or treatment. The form of increased ability and desire for hospital discharge could be seen from four components, namely knowledge, personal status, coping abilities, and support.

1. Personal status

Personal status is a description of physical and emotional conditions including patient confidence to go home, physical readiness, pain, strength, energy, and stress. The increase in personal status is expected to enable the patient to restore his condition gradually and overcome the possibility of health problems. The average personal status of the m-health discharge planning group was 15 times greater than the traditional discharge planning group.

2. Knowledge

Education is important so that patients have good knowledge about acute myocardial infarction management programs. The average value of knowledge in the M-health discharge planning group was 2 times greater than the traditional discharge planning group because education in m-Health discharge planning was done programmatically while the traditional discharge planning group was only given after the assessment process. The media used in Android-based discharge planning groups were also more interactive and applicable so that patients would get the maximum learning process.

3. Coping Ability

Patients with acute myocardial infarction often experience feelings of anxiety, worry, and fear of a heart attack again. This condition is aggravated when the patient has ineffective coping abilities. For that, preparing a hospital discharge based on coping ability is needed. The average value of coping ability before and after the implementation of Android-based discharge planning was 21.87 and increased to 22.20, while the traditional discharge planning group was 24.87 and increased to 26.07. Coping ability was measured by how well the patients' ability to deal with problems. The results showed that both the control and intervention groups had almost the same coping abilities.

4. Support

Support is the emotional, informational, and instrumental assistance provided after returning home. Significant support after returning home can reduce the incidence of readmission and improve health such as survival and quality of life [13]. The average value of support in the m-health discharge planning group had increased, in contrast to traditional discharge planning groups which had decreased. This expected support includes emotional, informational and instrumental support. The application of m-health discharge planning supported the realization of the expected support. Support has an important role in the process of continuity of care in order to create a healing process.

4. Conclusions

Based on this research, it is proved that m-health discharge planning was proven to optimize the hospital discharge readiness of patients with acute myocardial infarction. There was a significant difference in hospital discharge readiness values before and after the application of traditional discharge planning and m-health discharge planning, evidenced by the p-value of the independent unpaired t-test of 0.000. The average value of hospital discharge readiness for the m-health discharge planning group is 3 times higher than the traditional discharge planning. The rapid technological development in this globalization era allows m-health discharge planning to be used as a new method in implementing discharge planning.

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