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REVIEW ARTICLE

The role of innovative technology to improve patient centered care

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Abstract:

Chronic disease is a long-term disease. The treatment carried out by the patient is also routine and continuous to achieve therapeutic success and avoid complications that can occur. Adherence is one of the important factors to reduce complications of chronic diseases. Efforts are made to improve compliance, such as providing information about drug use from health care providers. The use of technology can also be an option as a facility for improving compliance, such as using audiovisual media as an addition to providing information and short message services or a mobile application for reminders to take medication on a smartphone. This article provides an overview of the role of technology in improving patient compliance, especially those suffering from chronic diseases. This article is based on a literature study of several literatures or research results. The literature reviewed shows that the use of video in providing information about drugs, sending short messages, and using a medication reminder mobile application has a significant effect on increasing adherence in chronic disease patients. The use of technology is effective and efficient in increasing the adherence of chronic disease patients.

Keywords: *Innovative technology, compliance, chronic disease, patient care*

Introduction

Chronic disease is a prolonged disease, does not heal spontaneously and rarely fully recovers. Types of chronic diseases are cardiovascular disease, respiratory problems, diabetes, HIV/AIDS, and so on. Long-term drug administration in chronic diseases can affect adherence (Marrero and E.Y, 2015). Adherence in drug use is one of the factors that influence the success of therapy. According to the WHO report, the average patient adherence to long-term therapy for chronic diseases in developing countries is lower than 50%. This low level of compliance can lead to failure to achieve therapeutic success (Indonesian Food and Drug Supervisory Agency, 2006). Adherence can be influenced by patient characteristics such as gender, age, duration of illness, and the type of drug obtained (Srikartika et al., 2016). As for some of the reasons patients do not take medication so that it affects compliance in treatment, patients forget and do not understand how to use drugs (Srikartika et al., 2016). One of the actions that affect patient compliance is providing information about drug use (N.G Tumiwa, V.Y Yamlean and Citraningtyas, 2014) and providing medication reminder facilities to patients (Dayer, 2013).

Along with technological developments, the intervention of providing treatment information by doctors or health workers to patients can be added by providing information using multimedia during counseling such as videos, so that it is interesting and not monotonous (Rinik Eko, Rustina and Widyatuti, 2013, Cicharello et al., 2013). The use of technology can also be used to assist patients in remembering when to take medication, for example by using short message services and other mobile applications. The digital marketing research institute Emarketer estimates that in 2018, active smartphone consumers in Indonesia will reach more than 100 million people (Herbawan and Sharif, 2018). This makes technology one of the facilities that play a role in improving patient compliance (Citandarello et al., 2013, Dayer, 2013).

Method

The method used in writing the article review is by searching for data from the internet such as Google Scholar and Pubmed. The search keywords used were technology, compliance, chronic disease with the last 10 years (2011-2020). The search criteria article in English and Bahasa, all the study design, and discuss the technology in healthcare. During initial search, 52 articles were collected then evaluated by considering the title abstract. After perusing the entire article, a total of 48 articles were excluded. Then 5 articles were included for final analysis (**Table 1**).

Patient Compliance in Medication

Treatment adherence is the patient's behavior in taking treatment by following the treatment rules obtained from health services (Akhu-Zaheya and Shiyab, 2017). Adherence to treatment is an important component in the success of therapy, especially in the long-term therapy of chronic diseases (Hu PharmD et al., 2014). Several methods that can be used to measure compliance include direct or indirect methods. The direct method is for example by direct therapeutic observation, while the indirect method can be in the form of interviews, medical records, filling out questionnaires and using electronic recording tools (Font et al., 2012).

Factors that influence medication adherence include demographics such as age and education, patient understanding and perception of the disease, the model of health service providers in providing treatment, the relationship between patients and health professionals, the influence of the health system and the complexity of the type and method of taking medication (World Health. Organizations, 2003). In the study of Neiman et al. (2017), it was reported that there were several reasons behind the patient's non-adherence to the recommended treatment regimen, and the highest reason was patient forgetfulness.

No	Author	Location	Sample	Intervention	Results
1.	Dian Oktianti, <i>et al.</i> (2019)	Klinik Gracia dan Puskesmas Lerep, Ungaran	Patient with Hipertension	Video	Adhrence is increased
2.	Riza Alfian dan Zakiah Wardati, (2016)	Poliklinik Penyakit Dalam RSUD Dr.H.Moch Ansari Saleh Banjarmasin.	Patient with Hipertension	<i>Digital Pillbox Reminder</i>	Adhrence is increased
3.	Riza Alfian, <i>et al.</i> (2017)	Puskesmas Melati, Kabupaten Kapuas	Patient with Diabetes	SMS	Adhrence is increased
4.	Riza Alfian, <i>et al.</i> (2017)	Depo Farmasi Rumah Sakit Umum Daerah (RSUD) Ulin Banjarmasin	Patient with Diabetes	Digital reminder application	Adhrence is increased
5.	Guo, <i>et al.</i> , (2018)	Rumah Sakit China Selatan	Pasien with HIV	SMS	Adhrence is increased

Table 1. Study findings

The role of technology in patient care

Technological developments can be utilized in the pharmaceutical sector, some of which are in providing information using videos, short message services, and medication reminder applications on the patient's smartphone. The data shows that the level of knowledge about hypertension increases up to 85% when using video (Maulana, 2009 in Oktianti et al., 2019). Research conducted by Oktianti et al. (2019) at the Lerep Health Center and Gracia Clinic showed an increase in the compliance of hypertension patients after being given an intervention, namely by providing drug information using videos. The increase in the average value before and after the intervention was 1.925. From the paired t test data (paired t-test) conducted in this study, the results obtained p value = 0.000 (p <0.05) which indicates a significant effect on increasing medication adherence from the intervention using video media. The provision of interventions with a digital pillbox reminder

application in hypertensive patients carried out by Alfian and Wardati (2016), showed a significant increase in patient compliance with a p value = 0.001 and seen from the compliance criteria of hypertensive patients after the intervention was given by 46.67%, while before being given intervention of 20.00%. Digital pillbox reminder is an application to remind the time of drug consumption in the form of an automatic reminder alarm set by the pharmacist.

Research conducted by Susanto, Alfian and Rusmana (2017), showed a significant increase in medication adherence for type II DM patients with p value = 0.001 and seen from the mean score of the MMAS-8 questionnaire before and after the short message service intervention. The increase in the mean score of MMAS-8 before and after the intervention was 1.6 with the mean before the intervention was 5.8 and after the intervention increased to 7.4. Giving intervention to 25 diabetes mellitus patients in the form of a digital medication reminder application conducted by Alfian, Maulana and Putra (2017), showed a significant increase in medication adherence in diabetes mellitus patients with a p value = 0.00. Patients who had high adherence before the intervention were 2 people while after being given the intervention increased to 15 people. In the results of this study there were no patients who had low adherence, whereas before the intervention patients who had moderate adherence were 23 people and after the intervention patients who had moderate adherence were 10 people.

Research conducted by Haberer et al. (2017) mentions that technology can be a solution to support adherence to ARV treatment in HIV/AIDS patients. Short message services and voice calls, electronic dose monitors and electronic pharmacies (drug refill tracking system) can be done using a smartphone. Guo et al. (2018) intervened for 3 months by giving short messages (SMS) once a week containing reminders of medication adherence. The results obtained were 91% responded positively and 86.4% smartphone users reported optimal adherence to ARVs. Increased compliance of patients who were given the intervention occurred significantly with a p value <0.05. According to Nhavoto, Grönlund and Chaquilla (2015), cell phone/smartphone-based interventions have been used for many diseases, especially diseases with long-term treatment such as HIV. The low cost and convenience of short message services can make this technology an alternative strategy to improve medication adherence.

Conclusion

Based on the results of the literature study, it can be concluded that technology has an influence on the compliance of patients with chronic diseases such as hypertension, diabetes mellitus, and HIV/AIDS who must take drugs every day in the long term. The use of video in providing information about drugs, sending short messages and using a mobile application for taking medication reminders is effective in increasing patient compliance. The use of technology needs to be continuously developed so that it is more efficiently used as a medium in the health sector.

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