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JURNAL KEPERAWATAN KOMPREHENSIF	VOL. 8	Special Edition	Page 1-222	Bandung June 2022	ISSN 2354-8428  e-ISSN 2598-8727
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## Review Article

### Technology-Based Interventions in Schizophrenia Patients : A Narrative Review

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Received : 15/05/2022

Revised : 23/06/2022

Accepted : 28/06/2022

Online : 30/06/2022

Published : 30/06/2022

#### Abstract

**Aims:** The development of technology to facilitate the management of schizophrenia is still very limited so that many people don't know the benefits and efficacy of using technology as an intervention in schizophrenia patients.

**Objective:** This literature review aimed to describe and determine the efficacy and benefits of using the technology used in schizophrenia patients.

**Method:** The method used was a narrative review by combining articles from the PubMed, EbscoHost, Taylor and Francis, and Google Scholar databases. The keywords used were "adults" OR "middle aged" AND "telenursing" OR "telemedicine" OR "telehealth" AND "schizophrenia patient".

**Result:** From these 6 articles, it was found that there were several perceived benefits of using technology as an additional intervention, such as medication adherence, involvement in recovery and symptom control, and early detection of cognitive function in schizophrenic patients.

**Conclusion:** Interventions using technology such as telehealth, telenursing, and telemedicine can be supportive interventions for the care of schizophrenic patients, especially to assist recovery or rehabilitation.

**Nursing Implications:** The existence of this study can provide an overview to nurses regarding what technology-based support interventions can be given to schizophrenic patients along with their benefits.

#### Keywords

Schizophrenia, Telenursing, and Telehealth

## INTRODUCTION

People with schizophrenia reach more than 21 million people in the world. Schizophrenia affects about 1 in 300 people (0.32%) worldwide or the equivalent of 24 million people with schizophrenia (1). Based on data from the Riset Kesehatan Dasar (Riskesdas) (2019), the number of

people with schizophrenia in Indonesia is around 6.7 per 1000 households. Schizophrenia is a psychiatric disorder in which patients experience significant comorbidities, which are characterized by decreased cognitive and psychological functions in schizophrenic patients (3). People with schizophrenia need to be integrated into social life in order to

maintain a productive life (4). Therefore, people with schizophrenia need adaptive coping in managing the difficulties and stressors that arise to protect and maintain their mental health (5).

Telehealth technology is a potential in providing nursing care to schizophrenic patients (6). The use of telehealth and telenursing technology can facilitate access to health services effectively and efficiently, reduce costs, provide social support, and improve the quality of care (7). In addition, Uslu dan Buldukoğlu (2016) also say that the use of telenursing technology in the care of people with schizophrenia allows patients to receive positive results from the treatment. Then, the application of technology can help bridge the gap between healthcare professionals and patients (6). So nurses need to pay attention to the use of telehealth technology in providing nursing care to schizophrenic patients as a comprehensive and sustainable service (8).

Apart from the advantages, technology-based interventions given to those with psychosis also have some limitations. According to Lim dan Penn (2018) the use of telehealth technology in providing nursing care can cause schizophrenic patients to relapse if not used properly. Therefore, telehealth technology aids need to be accompanied by guidelines or modules regarding the use of the tools, either in the form of modules or video usage guidelines. In addition, the results showed that the level of adherence in the use of the intervention was at a moderate to low level of adherence (9).

The use of telehealth in the form of web and mobile applications, digital technology has tremendous potential in facilitating mental health care including schizophrenia (9). The most commonly used telehealth technology in providing interventions in schizophrenic patients is telephone-based practice (6,7). The use of technology in online intervention services can also prevent stigma from others (10). Thus, the application of technology can be

said to be effective as a media for mental health services.

Based on the above problems, some literature discusses related to the benefits of using technology in mental patients but does not specifically discuss the benefits of technology in supporting treatment in schizophrenia patients so that the efficacy and benefits are still not widely known. The purpose of this study is to describe and determine the efficacy and benefits of using technology as a means of nursing intervention in schizophrenic patients.

## METHODS

### Design

The design used in this article review is the narrative review method.

### Search Strategy

Search articles in this study using PICO (Population, Intervention, Comparison and Outcome). Article searches were conducted using four databases, namely PubMed, Taylor and Francis, EbscoHost, and Google Scholar. In the literature search the keywords used were “adults” OR “middle aged” AND “telenursing” OR “telemedicine” OR “telehealth” AND “schizophrenia patient”.

### Article Criteria

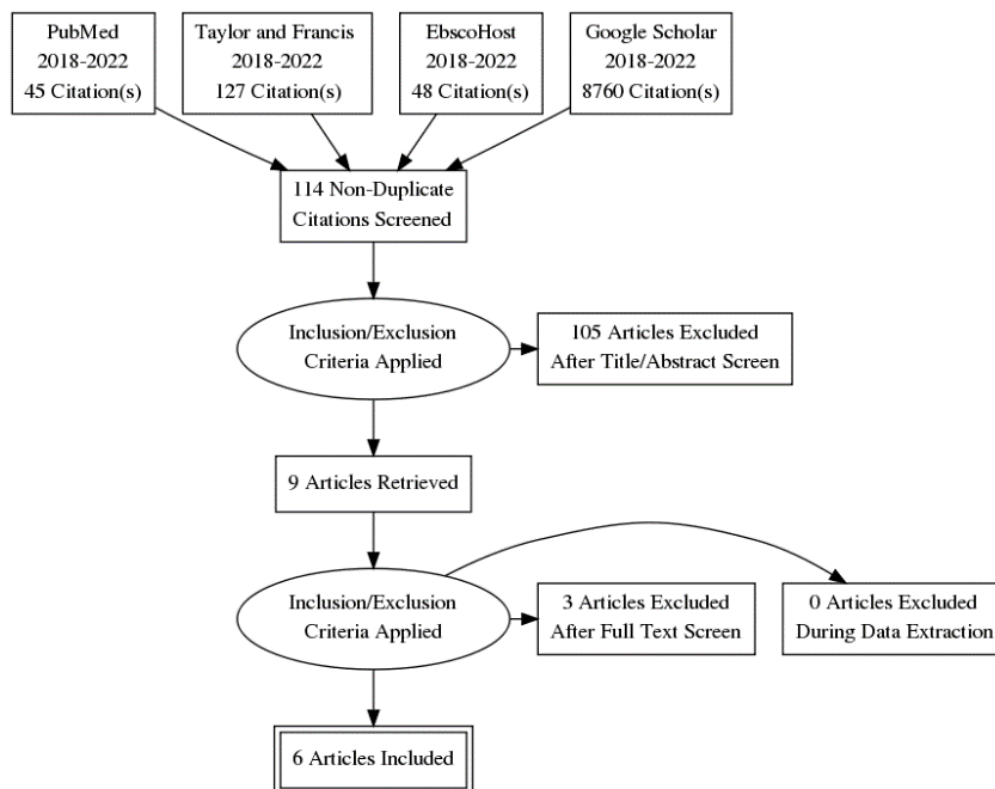
The inclusion criteria in this narrative review are articles discussing technology-based interventions in schizophrenic patients, the year the article was published 2017-2022, articles in English, full text, and RCTs. Meanwhile, the exclusion criteria in this narrative review are review articles or review articles.

### Data Extraction

In this article review, data extraction is done by looking at the eight appropriate articles and then writing down the important findings in the article into the article review data extraction table.

## RESULTS

**Figure 1. Diagram PRISMA Flowchart**



After doing a literature search through the databases, namely PubMed, Taylor and Francis, EbscoHost, and Google Scholar, we got 8,980, 45 from PubMed, 127 articles from Taylor and Francis, 48 articles from EbscoHost, and 8,760 from Google Scholar. Then, the articles were sorted according to the inclusion and exclusion criteria that had been set. The results of the sorting obtained 116 articles. After that, screening of title selection, abstract selection, and full text was carried out on the 116 articles and produced 6 articles, 2 articles from PubMed, 1 article from Taylor and Francis, 1 article from EbscoHost, and 2 articles from Google Scholar. A total of 6 articles were then analyzed.

There are several benefits derived from interventions using or based on technology in schizophrenic patients. Based on 6 articles, it was found that the use of

technology can be beneficial in medication adherence, recovery involvement and symptom control, and as an early detection of cognitive function.

The search results using these keywords obtained 105 articles and only 6 articles were reviewed and analyzed in this literature review. The articles found are in English. All articles conducted research in developed countries (Turkey, USA, Canada). The total population in all studies is 733 people. The population and research sample are at least 29 people in the study Uslu, Buldukoğlu, dan Beebe (2019), while the largest sample amounted to 391 in the study (12). The articles discussed are randomized controlled trials, quasi experimental, and experimental studies. To see the results of the analysis of the article specifically, it can be seen in table 4.1.



**Table 1. Extraction Data**

No.	Author	Location	Purpose	Population and Sample	Methods	Intervention	Result
1.	(13)	Turkey	Effect of “Telephone Intervention Problem Solving” (TIPS) on medication adherence	Population: Patients with a diagnosis of schizophrenia  Sample: 46 patients Control: 24 people Intervention : 22 people	Randomized controlled trial	<b>Control Group</b> Routine care provided by the hospital  <b>Intervention Group</b> 1. Before being given TIPS, the patient was given Medication Adherence Training (MAT) for 20 minutes for 2 days before the patient went home 2. After discharge, the first TIPS is applied on the day and time planned by the patient. 3. TIPS are applied by researchers once a week eight times for 2 months.	The result of the study showed that TIPS can prevent schizophrenic patients from voluntarily discontinuing treatment and increase their belief in the need for treatment and medication adherence.
2.	(5)	United states	Effect of weekly TIPS on quantitative measures of psychiatric and non-psychiatric medication adherence in stable outpatients	Population: Outpatients with schizophrenia spectrum disorders (SSDs)  Sample:105 patients	Randomized controlled trial	<b>Use of TIPS for 6 months</b> 1. During the TIPS intervention, the nurse expresses and reinforces the value of adherence. 2. Respondents were given about the benefits of compliance (attitudes), and problem-solving barriers to compliance (perceived behavioral control/self-efficacy).	The result showed that weekly TIPS have no significant difference between groups at baseline or the 6-month measurement point.
3.	(14)	Canada	Knowing the due diligence of a schizophrenia-focused mobile app	Population: Schizophrenic patients residing	Quasy Eksperimental	<b>Use of App4Independence (A4i)</b> Using A4I for providing	The result of study showed that mobile app can reduce depression and have significant changes in recovery



No.	Author	Location	Purpose	Population and Sample	Methods	Intervention	Result
				in Canada either outpatient in hospital or outpatient with psychiatry		implementation to engagement. schizophrenic patients with text-based applications	
				Sample: 38 respondents			
4.	(12)	America	Developed and tested ten neuroscience-based web-based cognitive assessments	Population: New patient with schizophrenia at Sans Francisco Va Medical Center  Samples: 391 respondents	Randomized controlled trial	<b>Online Neurocognitive Assessments (ONAs)</b> The use of remote web to see behavior in schizophrenic patients both clinically and non-clinically	The result of study showed tat ONAs can distinguish schizophrenic patients from healthy controls with a reasonable and has a promising construct, convergent, and external validity.
5.	(11)	Turkey	Introduce Telephone Intervention Problem Solving (TIPS) and incorporate TIPS	Population: Patients with schizophrenia  Sample: 29 respondents	Eksperimental studies	<b>Using TIPS for 3 months</b> 1. Weekly telephone calls with nurses asking about difficulties in medication adherence, psychiatric symptoms, and individual stress. 2. Call duration 10 minutes.	The result showed that patient's symptom level is decreasing and ratio of drug adherence increased.
6.	(15)	USA	Find out the impact of family support and telehealth	Population: Patients with a diagnosis of schizophrenia  Sample: 104 respondents	Randomized controlled trial	Telehealth delivery.	The result showed that patients treated with telehealth were more likely to disengage than people receiving face-to-face care.

## DISCUSSION

### 1. Medication adherence

Adherence to treatment in schizophrenic patients is a very important aspect (16). This problem is one of the challenges for health workers to be able to increase awareness in adherence to prescribed drugs. The research of Uslu dan Buldukoglu (2020) answers the problems that are currently happening. Uslu dan Buldukoglu (2020) said that the use of TIPS "Telephone Intervention Problem Solving" in schizophrenic patients can improve adherence in the treatment process. This is in line with Beebe et al., (2017), which showed that schizophrenic patients with TIPS intervention had higher medication adherence than the control group. This means that the presentation before and after being given the TIPS intervention increased by  $\pm 4.8\%$  (5). This is supported by the research of Uslu et al. (2019) which states that TIPS can improve psychiatric medication adherence in schizophrenic patients and can reduce relapse symptoms.

The research of Uslu and Buldukoglu (2020) and Beebe et al., (2017) is supported by the results of the research of Alston et al. (2019) which states that telehealth has a significant effect in improving psychiatric medication adherence in schizophrenic patients. It is shown from the results of the study that patients treated with telehealth finished treatment faster than face-to-face interventions ( $p$ -value = 0.0177). So it can be concluded that telehealth intervention can effectively improve treatment adherence of schizophrenic patients.

TIPS was developed by Beebe et al., (2017), TIPS is a telenursing application based on planned behavior theory. This application is a solution in solving the daily problems of schizophrenic patients. TIPS is done by two-way communication by telephone every week. Interventions were also carried out by agreeing on a telephone time between the nurse and the patient. nurses have a role to guide schizophrenic

patients in solving problems from the results of identifying the difficulties faced by patients, finding solutions, and following up on the effectiveness of the solutions that have been carried out. An example of an intervention is that a patient reports a medication adherence problem due to forgetting the dose and forgetting the time, the nurse will make a reminder sign, identify the role of the family or caregiver to remind, associate taking medication with other activities so that the patient can remember it. Thus, treatment in schizophrenia patients can run smoothly and have high medication adherence.

### 2. Recovery Engagement and Symptom Control

The research of Kidd et al., (2019a) shows that involvement in the recovery process and symptom control is important for reducing schizophrenia symptoms. In the study of Kidd et al., (2019a) the App4Independence (A4i) application serves to monitor the recovery involvement of schizophrenic patients. This app is a cross-platform software that can be downloaded on Android or iOS. This application consists of two main types of features, namely real-time features in the form of information about schizophrenia and offline features, namely toolkits and voice detectors. Furthermore, the Cordova plugin is a feature that functions to access native smartphone features such as microphone, accelerometer, and camera.

The results of the study by Kidd et al., (2019a) showed that the A4i application was proven to be effective in a significant improvement process in reducing psychotic symptoms, depression, anxiety, paranoid ideas, and interpersonal sensitivity. In addition, the results of the PROM measurements showed that the A4i application had a significant increase in recovery engagement. Therefore, this application can be said to be effective in improving adherence to recovery involvement and symptom control in schizophrenic patients.

### 3. Early Detection Cognitive Function

Impaired cognitive function is one of the symptoms and effects of schizophrenia. Cognitive impairment in schizophrenia can lead to chronic disability because it is severe, long-lasting, and causes ongoing impairment. A standardized platform is needed to identify cognitive impairment and measure treatment effects to conduct comprehensive evaluation and treatment in individuals with schizophrenia (17).

The research of Biagianti et al., (2019) showed that the use of the Online Neurocognitive Assessments (ONAs) application was able to measure theoretical cognitive construction with a completion time of 40 minutes. The application can also differentiate schizophrenic patients who have healthy controls from those with severe (AUROC >.70); and have an effective, comprehensive, and sustainable construct. This application is able to test processing speed, sustained attention, executive function, learning and socio-affective processing in auditory and visual modalities in patients with schizophrenia.

Cognitive interventions conducted online can be more effective in reducing the impact of schizophrenia by reducing time and costs (18). Each domain of interest (perception, attention, executive function, learning, and socio-affective processing) can be assessed digitally without having to be face-to-face. This shows that telehealth applications are effective in preventing more severe cognitive impairment in schizophrenic patients.

### CONCLUSION

Based on the results of the study, there were 6 articles that discussed the use of technology for intervention in schizophrenic patients. From these 6 articles, it was found that there were several perceived benefits of using technology as an additional intervention, namely medication adherence, involvement in recovery and symptom control, and early

detection of cognitive function in schizophrenic patients. So it can be concluded that interventions using technology such as telehealth, telenursing, and telemedicine can be supportive interventions for the treatment of schizophrenic patients.

### NURSING IMPLICATIONS

The existence of this literature study is expected to be an illustration for all health workers, especially nurses, to be able to carry out various kinds of prevention in reducing the population of sufferers who experience schizophrenia. In addition, it can provide an overview of what technology-based support interventions can be given to schizophrenic patients.

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