

ORIGINAL ARTICLE

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# Post-Discharge Nursing Care for Chronic Kidney Disease Patients Using Interactive Voice Response & Web-Based Decision Symptom Management System: A Literature Review

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## Abstract

Sustainable treatment of chronic kidney disease (CKD) should include deceleration of disease development and maintain quality of life when it already on end-stage condition. Specific methods are needed for nurses to care for discharged patients efficiently. The process that currently developed the most is a communication technology-based method, and one of the potential ways is *Interactive Voice Response (IVR)* and *Web-Based Decision Support-Symptom Management System (DS-SMS)*. The study aimed to describe *Interactive Voice Response (IVR)* and *Web-Based Decision Support-Symptom Management System (DS-SMS)* and its function for post-discharge nursing care for chronic kidney disease. All articles were selected through Google Scholar, ProQuest, EBSCOhost, and SpringerLink online database search were with keywords and inclusion criteria. *IVR* and *Web-Based DS-SMS* is a combination of interactive voice recording telephone systems and logical database systems that can be used for post-discharge patient care. Its activities, including symptom monitoring, self-management coaching, and nurse practitioners' follow-up. It requires sophisticated design and development of content and systems, and in its application, resource use can be minimized. This system is particularly suitable for patients with chronic kidney disease, who require symptoms management such as nausea, vomiting, changes in urine output, sleep disturbances, and pruritus, and require education and intervention such as fluid and electrolyte control. Post-discharge nursing care using *IVR* and *Web-Based DS-SMS* is the potential to be applied in CKD patients.

**Keywords:** Chronic kidney disease, post-discharge care, IVR, web-based DS-SMS

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## Introduction

CKD is a type of non-communicable disease that has a high prevalence and continues to increase annually. The global prevalence of CKD is reaching 13.4% (1). Global Burden of Disease in 2015 reported that NCD was the 12<sup>th</sup> leading cause of death from 1.1 million deaths worldwide (2). The mortality of CKD patients increased by 31.7% in the last ten years. In Indonesia, several CKD patients undergoing hemodialysis therapy reached 30,554 people in 2015 (3). This number tends to increase every year, especially patients undergo replacement therapy.

Diagnosis of CKD is established when kidney damage occurs more than three months, or Glomerulus Filtration Rate (GFR)  $<60$  ml/minute/  $1.73$  m<sup>2</sup> with or without any damage to kidney structure (4). Patients with this condition have a high risk of End-Stage Kidney Disease (ESKD) development if they cannot maintain their diet, exercise, blood glucose level, and hypertension (5). Patients of ESKD stage should have a routine kidney function replacement therapy. However, this therapy does not guarantee to heal among patients completely. Data from PERNEFRI stated that the highest number of deaths in CKD patients under renal replacement therapy was relatively short, approximately only 6-12 months. However, this can be inhibited by proper management and sustainable care.

Treatment in CKD patients should be focused on preventing patients from the ESKD stage and maintaining stable conditions when end-stage. The treatments included controlling fluid balance, electrolytes, nutrition, including management of hypertension, hyperglycemia, anemia, dyslipidemia, and mineral bone disorder (4). At the hospital, patients treated by the healthcare team. However, when returning home, patients are required to be able to carry out a therapy regimen independently with family assistance.

Efforts to implement the management of chronic kidney failure in post discharged patients are carried out by giving discharge planning to patients and their families. But the method is not yet optimal because it is only done once before the patient returns home. The technique is also very limited in the form of education planning for follow-up care at home. Although there have been studies that have developed multimedia discharge planing media such as those carried out by Hariyati, Afifah, & Handiyani, the method does not include follow-up, monitoring, motivation, and ongoing education as long as patients are treated at home (6).

Along with the development of communication technology and information, several other research results demonstrate the effectiveness of technology-based nurse-led care post-discharge to improve patient self-care and quality of life in patients with chronic diseases in both developed and developing countries. The forms of nurse-led care post-discharge include using telephone media and social networks where each patient is contacted by a nurse case manager within a specified period to provide consultation, monitoring, or support services for patients undergoing home care (7). However, both methods are considered still too manual and require additional nurses to facilitate one by one patient. In other words, the technique requires sufficient resources to make the application run optimally for all patients.

At present, other methods can combine several maintenance activities in one system using a more automated service system. The system uses the Interactive Voice Response (IVR) and Web-Based Decision Support - Symptom Management System (DS-SMS) methods. Both methods are integrated into a system called Symptom Care @ Home, which was developed to provide post-hospitalization care for patients undergoing chemotherapy (8). Based on this, the author interested in reviewing the potential of this method for CKD patients.

## **Objective**

To describe Interactive Voice Response (IVR) and Web-Based Decision Support-Symptom Management System (DS-SMS) and its functions for post-discharge nursing care for chronic kidney disease.

## Methods

Articles are obtained from Google Scholar, ProQuest, EBSCOhost, and SpringerLink online database. Articles were searched by entering keyword combinations include "telenursing," "chronic kidney disease," and "follow-up care." Inclusion criteria were used to determine the selection of the article. Articles should be published in the last ten years, the English language, and has free full-text access. As a result, 11 most relevant articles that were used as the primary reference.

## Result

### What is IVR and Web-Based DS-SMS?

IVR and DS-SMS is a form of telecommunication technology and information systems for telenursing. IVR is an interactive voice recording phone that can respond to the patient's response using a logic programming system. IVR works by using algorithms and speech recognition technology to collect information on patient symptoms (9). The list of questions and responses provided refers to content that has been designed by the program developer so that it can achieve the purpose of using the system. DS-SMS is a system that contains a database and the logic response that will be raised using IVR. IVR and DS-SMS are run together to form a system. Patients can report the latest conditions (symptom monitoring), get an education (self-management coaching), connect with nurse practitioners in certain situations (alerting) and get interventions from problems related to the disease experienced (follow-up nurse practitioners) (8). The flow of use of the IVR and DS-SMS systems is explained in Figure 1 below.



Figure 1. The flow of use of the IVR and DS-SMS systems (8)

**Monitoring Symptom.** In implementing this system, each patient calls a toll-free telephone number and uses a password to enter the system. Through answers given by the patient, the system then assesses whether there are symptoms and the extent of their severity. Patients are asked to call every day before noon. Patients will be asked how they are in the

last 24 hours. If the patient experiences symptoms, the telephone continues. If the patient is too sick to call, has no signs, or is hospitalized, the call ends. Examples of interactive communication are shown in Figure 2 below.

***Self-management coaching.*** The self-management strategy designed in various ways. Some messages are programmed to give automatically when a specific symptom threshold is reached. For example, if the patient reports a fever of 38°C or more, the system notifies the patient to report the temperature to the doctor. As an alternative, optional choices are offered in response to the pattern of symptoms. Patients can choose to listen to or miss a message. Another method is a session where once a strategy is selected, the system will automatically offer successive courses on each subsequent phone call. For example, energy conservation strategies are available for six consecutive days.

***Alerting.*** The system automatically generates a warning based on a predetermined threshold where the patient may need a direct conversation with the nurse. Clinical warning types include signs for each event, such as the severity of pain four or more; warnings that require specific response patterns such as sleeping problems at a higher level for 3 of the last seven days; special cautions for non-symptomatic conditions such as falls; general warnings such as "patients feel too sick to call"; and warnings due to unreasonable responses that require validation.

***Nurse Practitioner Follow-up.*** All responses given by patients are processed using DS-SMS, which has benefits including giving patients reported information about symptoms and other problems that require attention; allows nurses to manage workflows and provide responses to warning reports; linking symptoms with a list of follow-up and special (pharmacological and non-pharmacological) interventions based on official management guidelines; provide direct access through links to intervention reference sources; provide documentation about symptom information collected above each therapeutic cycle that allows nurses to visualize symptoms and patterns of patient-specific symptoms through graphs; and automatically generate reports of all relevant data from each telephone call.

IVR and DS-SMS have been used in the treatment of cancer patients undergoing chemotherapy (8). But in terms of the method of use, the system is very possible and suitable to be applied to CKD patients.

## **Discussion**

The use of communication technology media for CKD patient's treatment after hospitalization has been published in several journals and shows positive results. Research conducted by Jahromi et al., indicate that Nurse-Led Telephone Follow up (Tele-Nursing) improve the psychological condition in CKD patient undergoing hemodialysis (10). A follow-up call from the nurse 30 days after the change in dialysis contains consultations that are structured with topics including communication, awareness/development, breathing/circulation, nutrition, elimination, sleep, pain/perception, skin/tissue, sexuality/reproduction, activity and psychosocial /spirituality/culture. The results showed that the intervention group had lower levels of depression, coping, and stress than the

control group. A study conducted by Brennan et al., also mentions that telephone-based disease management programs led by nurses are significantly more effective than direct home monitoring alone to control blood pressure (11). This shows the benefits of telenursing follow-up as non-pharmacological therapy to improve the patient's psychological condition. Also, a study conducted by Lockwood et al., which described the description of the use of digital communication devices in CKD patients, showed that most patients were more comfortable using cell phones than internet/email to communicate and receive information (12). It can be used as the basis for telephone selection as a medium for giving nursing intervention.

However, the form of interventions that involve personal consultation via telephone, covering quite a several subjects, needs to influence considerable costs and requires adequate human resources to reconsider the useful values promoted as decided to be used in public health services. Other research conducted by Li et al. also shows that post-discharge telephone led by nurses for CKD patients undergoing peritoneal dialysis can improve some aspects of a patient's quality of life and decrease the rate of re-admission (13). Phone follow-up contains physical, social, cognitive, and emotional needs support. Patients get an education program by case managers nurse before patients discharged. After the patient returns home, the case manager nurse contacts the patient every week for six weeks. However, this study uses the same method with previous research. It may require more significant resources because the frequency of interventions are more frequent. Besides using phone-call methods, other ways that have been tried are consultations through telegram application media (7). However, similar to previous plans, consultation session requires more nurses to be able to facilitate patients optimally.

It can be concluded that the treatment of post-hospitalization patients is essential to do, but should consider its effectiveness. The use of telecommunications media and social networks can be used as an alternative form of home care service that can also provide regular support and monitoring regularly. However, it is necessary to re-evaluate cost-effectiveness related to the resources used, as well as the reliability of its implementation for the long term in the future. Therefore, the innovation of using a system that is more automated but still does not reduce the quality of the nursing care service process needs to be further developed.

The effectiveness of nursing post-discharge intervention using IVR on adherence and self-management of patients with chronic diseases has been mentioned in several studies. A study conducted by Swendeman explained the use of IVR to improve the adherence of HIV patients in taking antiretrovirals. IVR was sent to patients daily to remind them to take medication, record symptoms related to physical and mental health. The results showed that one-month interventions indicate a significant adherence improvement (14). IVR also has been tried to be applied to cancer patients to follow up with the symptoms of pain experienced by patients and provide functional outcomes for symptom management (15). The results of the meta-analysis of 15 RCTs also showed that interventions using IVR also had a significant effect on medical compliance and physical activity (16).

IVR and DS-SMS can include important components in post-hospital care, including monitoring, education, and providing intervention. The system can be developed by involving nurse researchers and renal nurses to design system content, as well as bioinformatics experts, and programmers to build networks. The material created on the

application of IVR and DS-SMS for patients with renal failure includes screening of emerging symptoms including nausea, vomiting, decreased appetite, changes in urine output, fatigue, headache, sleep disturbances, pruritus, dry and flaking skin, bleeding, hypertension, and hyperglycemia; self-management education and interventions include restrictions on fluids, sodium, potassium, phosphate, protein, management of activities and exercise, stress and anxiety, rest and sleep; collaborative response includes treatment and treatment effects (4). This system is preferred in patients who have not reached ESRD so that the decline in kidney function can be inhibited.

## Conclusion

The application of IVR and DS-SMS systems requires good collaboration between nurses and patients. Patients are expected to be able to comply with the program by regularly contacting the system so that nurses can provide follow-up on the conditions being experienced by the patient. IVR and DS-SMS systems require the design and development of mature content and systems and involve certain experts and servers. But in its application, the use of human resources is not as much as the use of telenursing manuals where nurses must provide more time to be able to monitor and follow up patients directly by telephone. This system is very applicable and has a structured upbringing because it uses the official guidance guidelines for patient management that are integrated into the system.

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