



# Implementing a central venous catheter self-management education program for patients with cancer



Jeong Yun Park

88, Olympic-ro 43-gil, Songpa-gu, Seoul 05505, Korea

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## ABSTRACT

**Purpose:** To evaluate the effects of the central venous catheter self-management education program (CVC S-MEP) in improving knowledge, attitude, and behavior regarding CVC and in decreasing CVC-related complications in patients with cancer during homecare service.

**Methods:** A quasi-experimental, sequential cohort design study of patients with cancer and who have CVCs was performed to compare the effect of CVC S-MEP with usual care.

**Results:** The study group consisted of 45 participants (26 male and 19 female), and the mean age was 46.1 (SD, 10.5) years. The subjects of the CVC S-MEP had significantly high mean levels of self-management knowledge ( $p = 0.007$ ), attitude ( $p < 0.001$ ), and behavior ( $p = 0.002$ ). Also, the participants in the CVC S-MEP had significantly lower frequency of catheter-related complications ( $p = 0.030$ ).

**Conclusions:** The CVC S-MEP helped improve patients' ability to resolve problems and adequately respond to CVC-related emergency situations by fostering greater self-care ability. Additionally, providing practical information for CVC self-management in a gradual and repetitive manner had a notable positive effect on patients.

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## 1. Introduction

Most patients with hematologic malignancies have a silicone-tunneled central venous catheter (CVC) inserted into their chest for cancer treatment (Moller et al., 2010; Park and Park, 2011). Changes in the environment of cancer treatment, greater safety of systematic outpatient treatment, and greater use of home care have led to an increase in the number of patients who are discharged with CVCs (Allan et al., 2001). A well-functioning CVC is essential for providing intravenous chemotherapy and medical treatment associated with periodic marrow suppression, such as hydration, antibiotics, and transfusion.

A lack of appropriate CVC management can lead to local infections around the insertion site or catheter-related bloodstream infections, which can grow into systemic infections (Butt et al., 2004). Also, it can lead to occlusion due to blood clots, interruption in fluid infusion, and exposure to greater risk of complications related to catheter damage (e.g., the tube falling out or being torn/sliced) (Hamilton and Foxcroft, 2007; Kim et al., 2010). Such complications can delay cancer treatments, increase medical expenses

due to an extended length of hospital stay (Console et al., 2007; Nosari et al., 2006), and even increases the likelihood of mortality rates and other critical issues (Zitella, 2003).

While patients rely on medical staff for CVC management when receiving inpatient treatment, at home, these patients must maintain the CVC's function on their own. Such maintenance involves regular dressing and catheter flushing (Hamilton and Foxcroft, 2007; Karthaus et al., 2002; Shapey et al., 2009). As such, patients with cancer must know effective strategies for the prevention and early detection of CVC complications.

However, CVC management is an intimidating procedure for most people and can have a significant physical, psychological, and emotional impact on patients and their families. Among patients with cancer who are expected to practice CVC self-management, some might be reluctant to leave the hospital or might request that their CVC be removed after discharge due to a fear of complications such as infections or occlusions, as well as reinserting the CVC after such complications (Boersma and Schouten, 2010). Furthermore, patients with cancer who have experienced CVC-related complications during their hospitalization may avoid CVC self-management because of their anxiety associated with these past complications; many such patients exhibit a tendency to visit nearby hospitals or request outpatient visits for CVC management,

E-mail address: [pjyun@ulsan.ac.kr](mailto:pjyun@ulsan.ac.kr).

which generate additional medical costs (Allan et al., 2001; Console et al., 2007; Park and Park, 2011).

Nevertheless, patients must be capable of proper self-management of CVCs, given that they might experience unexpected CVC-related issues that require immediate assistance at home. Specifically, they must become experts in the prevention of complications and maintaining CVC function until completion of their cancer treatment (Tattersall, 2002; Wilson, 2008). They should develop a variety of skills, such as the ability to identify problems in their everyday lives and make decisions on their own to resolve these problems, utilize resources, seek out effective partnerships with medical staff in order to resolve CVC-related problems, and acquire concrete techniques for maintaining CVC function.

Several studies conducted abroad have reported that an educational program targeting CVC self-management conducted under the supervision of a healthcare professional was effective in reducing CVC-related infections and increasing patients' confidence in self-management (Møller and Adamsen, 2010; Møller et al., 2005). Poor knowledge regarding CVC self-management can lead to a lack of awareness regarding the importance of self-management, a lack of confidence in actually performing self-management, and ultimately a negative attitude towards CVC care (Møller et al., 2005). Thus, by avoiding self-management, patients may eventually become unable to adequately manage their CVC. One way of addressing this would be by providing information about the necessary care of CVCs, which can increase patients' knowledge of the device and help them achieve confidence in self-maintenance (Piredda et al., 2016a, 2016b). Accordingly, we thought it necessary to develop and evaluate the effects of a CVC self-management education program (S-MEP) for patients with cancer who discharged with CVC. This program would help to promote these patients' ability to solve CVC-related problems occurring in everyday life, and cultivate self-management skills for decision-making, utilizing resources, and forming partnerships with medical staff, particularly nurses, who are typically the main healthcare professionals involved in teaching CVC management and providing related services.

The aim of this study was to evaluate the effects of the CVC S-MEP in improving knowledge, attitude, and behavior regarding CVC and in decreasing CVC-related complications in patients with cancer. The hypothesized direct outcomes included increased self-management knowledge, attitude, and adherence to CVC self-management. The hypothesized indirect outcomes included better maintenance of CVC function, as indicated by decreased CVC-related complications such as occlusion, infection, and catheter damage.

## 2. Methods

### 2.1. Study design

A quasi-experimental, sequential cohort design study of patients with cancer who have CVCs was performed to compare the effects of CVC S-MEP with usual care. We first performed usual care with a group of patients with cancer (control group) at a tertiary hospital in Seoul, Republic of Korea. Then we implemented the CVC S-MEP at the same hospital with a new sample of patients (experimental group), and carried it out thereafter.

### 2.2. Subjects and setting

Patients diagnosed with cancer who were admitted to the Hemato-Oncologic Unit to insert a CVC from April to August 2011 were invited to participate. Patients were eligible if met the following criteria: aged 20 or above, diagnosed with cancer, able to

speak and write in Korean, willing to participate, and had their first CVC insertion during the study period. Regardless of whether they actually participated in the CVC S-MEP, patients were excluded if they had a history of CVC insertion, as this previous insertion may have affected their level of knowledge or attitude concerning self-management at home.

The sample size was estimated a priori using a power table for Student's t-test to achieve 80% power with an  $\alpha$  of 0.05. Because of the proven effects of education for self-management in adults, an effect size of 0.80 was considered. The power analysis yielded an estimate of 42 persons in total. With consideration of potential dropouts, we planned to recruit 31 patients per group.

The study was approved by the institutional review board (IRB) of the tertiary hospital at which the study took place (no. 2010-0752).

### 2.3. Intervention

The intervention (CVC S-MEP) was developed by a nurse researcher to help patients learn how to self-manage their CVCs. The program lasts for around 3 weeks on average. Patients were required to be actively involved in the educational process, which used a combination of didactic methods (short lecture, group discussion, and demonstration) with a CVC management booklet.

Overall, the CVC S-MEP comprised four 50-min face-to-face sessions, which took place during hospital admission (Table 1). The control group, by contrast, received standard care, which involved 30-min group education on CVCs.

In the first session of the CVC S-MEP, patients were encouraged to express their experience of CVC insertion with the aid of a booklet on the use and function of CVCs. The second session was conducted within 7–10 days of hospitalization immediately after chemotherapy. An opportunity to directly observe the insertion was provided through the use of a model and a 30 min education session was provided on CVC self-management tasks that the patients could practice at home (i.e., assessment of the CVC site, dressing, preparation and storage of the heparin solution, catheter-related complications, daily activities, and emergency measures). To help patients with cancer recognize the need for CVC self-management and to foster a positive attitude towards self-management, we asked participants to express emotions, including fears, related to CVC management.

The third session took place in the second or third week of hospitalization, and comprised demonstrations, using a model and CVC products, on dressing the CVC site and using heparin solution to flush the CVC, after which they practiced using the model under the instructor's supervision. Preparation of CVC products was checked and feedback on the process was provided. Furthermore, participants engaged in repeated practice of the aseptic technique and use of CVC products to familiarize themselves with the tasks. They were also taught how to seal the CVC while taking a shower, and cases of CVC-related complications were shared.

The fourth session was conducted in the fourth week, on the day prior to or the day of discharge from the hospital. During the session, the supervisor checked participants' CVC products, evaluated how well participants performed the self-management tasks using a checklist developed by the researcher, and provided feedback. If desired, participants were provided with a model on which to practice. Additionally, we confirmed participants' knowledge of post-discharge CVC self-management, such as early symptoms of CVC complications (i.e., infections, occlusion, and catheter damage) as well as emergency countermeasures and management of the CVC during daily activities such as showers or baths. Following a question-and-answer session regarding the program's content and management, re-education was provided if necessary.

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