

Self-management in patients with diabetic foot ulcer: a concept analysis[†]



Original article

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Abstract: **Objective:** This paper presents an analysis of the concept of patient outcomes.

Methods: The present study conducted searches on various databases, including Wanfang, Sinomed, CNKI, PubMed, Cochrane Library, Embase, Web of Science, and Ovid. The paper followed the Walker and Avant concept-analysis approach.

Results: Initially, 899 pieces of literature were identified through the search process, and after screening, 41 of them were ultimately included in the analysis. The identified attributes of the concept included (1) capability, (2) decision making, and (3) action. These antecedents were shaped by factors such as illness perception, self-efficacy, and family and social. The consequences included (1) physiological effects, (2) psychological effects, and (3) social influence.

Conclusions: The concept analysis of self-management in patients with diabetic foot ulcers (DFUs) not only aids in clinical practice and supports interventions, but also contributes to the development of self-management theory. The common goal of clinical medical staff is to assist DFU patients in improving cognitive ability, making correct self-management decisions, and enhancing self-management behavior.

Keywords: *conception • conceptual analysis • DFU • diabetic foot ulcer • self-management*

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1. Introduction

Diabetic foot ulcer (DFU) refers to infections, ulcers, and deep tissue damage occurring below the ankle and is typically associated with nerve abnormalities in the

lower extremities and varying degrees of peripheral vascular issues. Its primary manifestations are foot ulcers and gangrene.¹ DFU is often caused by factors such as

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poor glycemic control, underlying neuropathy, peripheral artery disease, or inadequate foot care. As living standards have improved, the prevalence of DFU has been steadily increasing, reaching as high as 25% among individuals with diabetes.² Shockingly, one diabetic individual undergoes amputation approximately every 20 s, according to research findings.³ Furthermore, the mortality rate among patients with DFU can be as high as 11% every year, with a 1-year recurrence rate of about 30% and a 5-year recurrence rate exceeding 70%.⁴

Patients with DFU can significantly enhance their ability to control blood sugar, facilitate wound healing, avoid amputation, and ultimately improve the quality of life of patients through effective self-management. Aliasgharpour et al.⁵ demonstrated that good self-management practices can save up to 85% of diabetic patients from undergoing amputation. Self-management is the ability to handle symptoms, treatment, and physical and psychosocial adjustments, as well as adopting lifestyle changes necessitated by chronic disease.⁶ DFU treatment guidelines recommend that patients with DFU engage in self-management, which involves daily foot examinations, the use of protective footwear unloading methods like crutches and heel reduction, and ensuring adequate protein intake.⁷

Self-management can be divided into 3 key aspects: disease management, role management, and emotion management. While the term “self-management” is widely used, there is no universally accepted definition. Barlow et al.⁶ believe that self-management is a dynamic continuous process in which individuals actively engage in managing the symptoms, treatment, and both the physical and psychosocial aspects of chronic diseases. This process primarily encompasses medical treatment, emotional management, and role management. Bandura⁸ suggests that self-management involves an individual's self-efficacy in assessing, observing, and achieving a certain goal. Curtin et al.⁹ describe self-management as patients actively monitoring their health status, cooperating with treatment and nursing activities, and taking measures to control disease progression, prevent complications, and minimize the impact on their quality of life. Lorig and Holman¹⁰ pioneered the self-management theory, which involves healthcare professionals providing education to empower patients with the knowledge and skills needed to manage their diseases effectively. This includes the ability to establish new social roles, cope with negative emotions, engage in productive medical collaboration, make informed decisions, and utilize resources rationally. This study aimed to conduct a conceptual analysis of “self-management of DFU” to establish a theoretical definition of the concept and determine its attributes, antecedents, and consequences.

2. Methods

We adopted the 8 conceptual analysis processes of Walker and Avant¹¹ as the organizational framework.

Step 1: Select the concept

As described in the previous article, the concept of self-management is not very obvious. However, treatment guidelines for DFU recommend that patients with DFU should engage in self-management.⁷ To provide a precise and operational definition of self-management intervention in DFU, a conceptual analysis was conducted.

Step 2: Determine analysis aims and purposes

The primary objective of the analysis was to define and conceptualize self-management interventions for DFU. This will include detailed investigations following the steps of a formal conceptual analysis.

Step 3: Identify all the uses of the concept

The scope of this analysis included the self-management interventions for DFU only. All types of interventions that were offered to promote self-management of the patients with DFU were reviewed. This was done to generate the most inclusive self-management conceptualization of DFU based on the results reported in recent literature. This is particularly important because the definition of DFU self-managed content is vague and therefore the operational definition is open to end users of the health system. Electronic searches were conducted in Wanfang, Sinomed, CNKI, PubMed, Cochrane Library, Embase, Web of Science, and Ovid. The search period was from January 1, 2000, to January 16, 2023. The target languages are English and Chinese. The terms used were “diabetic foot,” “diabetic foot ulcer,” “foot ulcer,” “diabetic foot gangrene,” “self-management,” “self-control,” and “self-care.” We selected studies that included these terms in their title and/or abstract.

Step 4: Determine the defining attributes

Attributes are considered an explicit feature of the concept. Systematic and purposeful methods are used to discover definitions of attributes, precedents, and consequences: (a) read the selected article, (b) identify features to specify self-management, (c) encode features that often occur, (d) perform characteristic grouping and classifications, (e) discuss categories and potential characteristics with experts, and (f) rename category attributes.

Step 5: Identify a model case

Based on real-life experiences with DFU patients, a model case representing all attributes was identified and developed as a case to illustrate how self-management was conceptualized.

Step 6: Identify additional cases

In order to be aware of the consequences of the lack of application of the defined attributes, other cases in

which all attributes are not fully applied or omitted will be considered in the analysis.

Step 7: Identify antecedents and consequences

Antecedents are events or conditions that occur or exist before a particular concept can take place. For example, in the context of DFU, self-management programs within the health system are considered a prerequisite. The consequences are those events or events that may arise as a result of the occurrence of the event. For example, reduce costs for health systems.

Step 8: Define empirical referents

The identification of empirical references for each defined attribute enables the concept to be measured more uniformly.

3. Results

The results presented in this paper were organized following these 8 steps.

Steps: 1–3

According to the inclusion criteria, 2 postgraduate students familiar with self-management were initially screened for independent reading of the questions and abstracts, and then the full text was obtained for further screening of irrelevant literature. A total of 899 articles were retrieved in this study, 139 articles remained after rechecking and reading of titles and abstracts, and 41 studies were ultimately selected for the conceptual analysis (Figure 1).

Step 4: Attributes

Through the above review and analysis, the researchers used the codes and categories that extracted the

data to critically evaluate the different articles. After discussion, 3 attributes were summarized as capability, decision-making, and action.

Attribute 1: Capability

This concept refers to the overall capabilities displayed when accomplishing a goal or a task. Research has shown that in the case of DFU patients, the higher their cognitive ability regarding their condition, the more positive their attitude toward self-management behaviors, and the more inclined they are to take proactive measures for self-management.¹² Several studies have demonstrated that educating DFU patients can improve their cognitive abilities, which in turn can positively impact their self-management efforts.^{13,14}

Attribute 2: Decision-making

This concept pertains to the process through which individuals generate ideas and make decisions regarding various events or situations. Decision-making is a complex cognitive process involving the collection and processing of information, ultimately leading to judgment and conclusions. For example, in the context of patients with DFU, decision-making might involve questions like whether it is safe for them to engage in physical movement and how to exercise safely.¹⁵ This process is related to the foundational knowledge acquired from healthcare providers, which guides personal judgments about what actions to take or avoid. In most cases, individual decision-making relies on the initial training and skills provided by healthcare professionals.

Attribute 3: Action

It is an activity performed for a certain purpose. The behavior of patients in managing their condition is

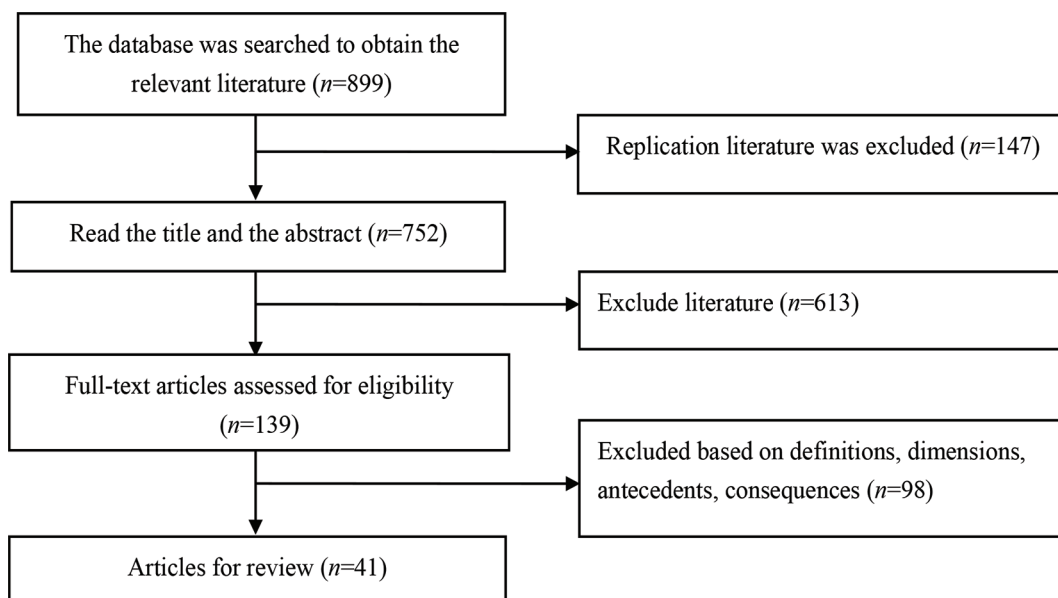


Figure 1. Selection process of the articles for review.

influenced by various factors, as indicated by numerous studies.^{16,17} To effectively implement these behaviors, healthcare providers need to offer personalized and customized education. Additionally, the support of family and the broader social network plays a significant role in facilitating these self-management behaviors.¹⁸

Step 5: Determining a model case

The Model case means that three of these attributes are visible and demonstrate the impact of a good self-management intervention defined through these attributes. In a fictional example, Jack is a 62-year-old male residing in Shanghai, China, with a decade-long history of diabetes. After receiving a diabetes diagnosis, he actively engages with healthcare professionals to gain a comprehensive understanding of DFUs and acknowledges the serious risks associated with this condition. He is resolute in his commitment to manage his blood sugar levels effectively. To ensure his well-being, Jack takes a series of proactive measures. He quits smoking, adheres diligently to his prescribed medication regimen, engages in regular exercise, and monitors his weight closely. Moreover, he goes the extra mile by customizing stress-relieving shoes designed to alleviate pressure on his feet, demonstrating his dedication to self-care. Throughout his journey, Jack benefits from unwavering support from his family, who have been by his side since his diabetes diagnosis. Their encouragement and assistance further contribute to his successful self-management efforts.

Step 6: Determining borderline and contrary cases

3.1. Borderline case

The boundary case is also fictional but lacks attributes. Belly is a 69-year-old woman who was diagnosed with DFU 1 month earlier. She started to control her blood sugar, talked to her doctor about how to cure DFU, and decided to take the necessary action to follow the doctor's advice, but every time she saw her favorite cake, she could not help but eat it all.

3.2. Contrary case

Contrary to the operational concept of the intervention, the following case exemplifies a real reverse scenario. Tommy, a 68-year-old male patient with a history of diabetes spanning over 20 years, experienced the loss of his right foot due to diabetes complications. Having been widowed at an early age and lacking support from his only son, Tommy had limited knowledge and involvement in self-care for his feet. He was unaware of the importance of self-management and primarily relied on advice from physicians and educators during clinic

visits. As a result, a DFU wound in his left foot remained unhealed for 3 years.

These cases highlight the intricate nature of self-management and can serve as examples to evaluate whether the intervention addresses the aforementioned 3 attributes. Furthermore, they shed light on what to consider when not all attributes are adequately covered.

Step 7: Determining antecedents and consequences

3.3. Antecedents

As previously mentioned, antecedents are events or attributes that need to be in place before self-management can take place. After discussion with the study group, we have collectively decided to categorize illness perception, self-efficacy, and family and social support factors into 3 distinct primary premises or categories.

Patients' perception of the disease significantly influences their self-management behavior, particularly in the context of DFU. Having prior experience with diabetes education can have a substantial positive impact on the care and management of DFU.¹⁹ Conversely, the absence of patient education and a lack of knowledge about diabetes can negatively affect patients' self-management behavior.¹⁷

Self-efficacy is a fundamental factor that influences individual self-management behaviors. It refers to the belief that individuals have in their ability to successfully carry out a specific action or achieve a particular goal.²⁰ The beliefs held by patients play a significant role in determining their foot care practices.²¹ Patients with higher levels of self-efficacy are more likely to consistently engage in self-management activities. In the case of diabetic patients, self-efficacy promotes self-management behavior²² including regular foot self-examination.²³

The involvement of family members has a positive impact on enhancing patient self-management behavior. A Canadian study highlighted the significant role played by spouses and children of patients with DFU in offering various forms of self-management support.²⁴ It was found that greater support from loved ones, family, and friends was associated with lower rates of depression and better patient self-management.¹⁸

3.4. Consequences

The role of self-management in patients with DFU is increasingly recognized in terms of its impact on their physical, psychological, and social aspects. In terms of physiology, self-management can lead to improved health outcomes, better control of blood glucose levels within the optimal range, reduced impairment of cellular

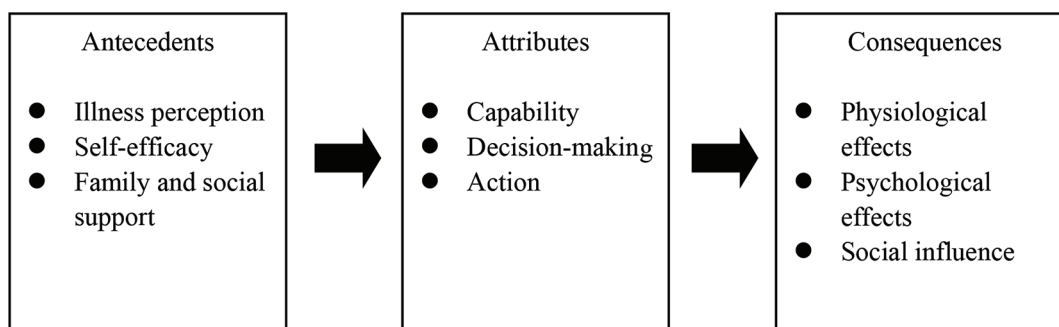


Figure 2. Self-management of patients with DFU: antecedent, attribute, and consequences.

immune function, effective promotion of wound healing, decreased amputation rates, and improved quality of life for patients.^{7,25} Psychologically, self-management can enhance the patient's self-efficacy. From a social perspective, self-management can effectively reduce the utilization of medical resources.

Step 8: Describing the empirical referents of the concept

Empirical references provide quantifiable ways to explore the potential use of self-management by identifying whether these attributes can be measured.²⁶ Currently, there is a wide range of self-management questionnaires available for diabetes, but there are limited self-management scales specifically designed for patients with DFU.

The Diabetes-related Foot Ulcer Self-Management Behavior Scale (DFUSMBS) was revised by Chin et al. in 2019, based on the California Podiatry Medicine Association's 2014 version.¹⁷ This scale consists of 3 dimensions: timely treatment of diabetic patients, wound management, and self-management. A higher total score indicates better self-management behavior in DFU, while a lower score indicates worse self-management behavior. The Cronbach's α coefficient for this scale is 0.80. It is a relatively simple and easy-to-fill-in scale that has been internationally certified and improved based on extensive use.

The self-management Behavior Scale for patients with diabetic foot was developed by Gona and Liu.²³ The scale consists of 3 dimensions: condition detection and control management (including 6 items), daily life management (including 6 items), and foot care management (including 4 items). The Cronbach's α coefficient for the scale is 0.796. The test-retest reliability of the scale is 0.664 and it has a CVI of 0.94. Although the scale demonstrates good reliability and validity, it does not include a wound-management dimension and is not widely used.

The Diabetes Foot Self-Care Behaviour before Hospitalisation (DFSBS) scale was developed by Chin and Huang in 2013.²⁷ This scale is primarily used to assess

foot self-care behavior and consists of 7 items, including foot inspection, cleaning and moisturizing, checking the interior before wearing shoes, and gradually wearing new shoes. Higher scores on the scale indicate better performance in foot self-care behavior. The Cronbach's α coefficient for the scale is 0.68. However, one limitation of this scale is that it focuses solely on foot self-care behavior in diabetic patients.

The attributes, antecedents, and consequences extracted as components of self-management for patients with DUF are shown in Figure 2.

4. Discussion

Self-management is a commonly employed concept in the management of chronic diseases, although its clarity may be lacking. Conducting a conceptual analysis of the self-management of DFU revealed 3 key attributes that serve as the foundation for developing an effective self-management scheme.

The mastery of foot knowledge in DFU is a significant factor in influencing self-management behaviors.¹⁷ Ugwu et al.²⁸ conducted a 1-year observational study of 336 DFU patients in Nigeria, which revealed that only 25.9% of the patients knew foot care. The amputation and mortality rates were alarmingly high at 35.4% and 20.5%, respectively. Health education has been shown to enhance patients' cognitive abilities and decision-making regarding the disease. A study found that patients who received diabetes foot health education exhibited better foot care behavior.¹⁹ Therefore, it is crucial for medical staff to provide systematic health education to patients with DFU. Lixian Xu et al.²⁹ utilized the information-motivation-behavioral (IMB) skills model to conduct information and motivational interventions for DFU patients. These interventions included issuing health education manuals, conducting face-to-face interviews, providing peer support, and involving family support. By offering personalized behavior guidance and experiential health education, the study successfully

improved the behavior skills, foot self-care knowledge, and self-care management ability of patients with DFU. In a similar vein, Toygar et al.³⁰ conducted health education based on Bandura's theory of social learning in Turkey. This intervention targeted 33 patients who had received their first diagnosis of DFU. The education covered areas such as foot assessment and care, nail trimming and care, daily lifestyle improvement, and choosing appropriate clothes and shoes. The intervention effectively enhanced foot care efficiency, diabetic foot knowledge, and quality of life.

The study conducted by Reyes et al.³¹ revealed that family support plays a significant role in influencing the self-management of diabetes. Family members can assist patients in improving their self-management skills by verbally reminding them about their food choices, recommending healthier options, and monitoring their dietary intake. In rural areas, patients face challenges in accessing timely DFU wound care services, which, coupled with a low level of self-management, can lead to the development of serious complications.³² According to Abrar et al.,³³ limited access to DFU-related care services and knowledge, as well as a lack of understanding among medical service providers, contribute to frustration and dissatisfaction among patients with DFU. Therefore, to enhance the self-management of patients, it is crucial to not only improve their cognitive abilities but also raise awareness among patients and caregivers. Additionally, increasing social support and providing patients with a wide range of available medical services are essential. Moreover, medical staff should expand their knowledge base, understand patients' needs, and strengthen communication with them to help patients acquire relevant information and effectively enhance

their self-management abilities. This external support is crucial for empowering patients and improving their self-management skills.

5. Conclusions

In this study, 3 attributes, 3 antecedents, and 3 consequences of the concept of self-management in patients with DFU were found, and the process of understanding and utilizing them was suggested. The concept of self-management in DFU plays a crucial role in clinical practice and intervention, as well as in the development of self-management theory. The common goal of clinical medical staff is to assist patients with DFU in improving cognitive ability, establishing correct self-management decisions, and enhancing self-management behavior. It is important to note that the self-management ability of individuals with DFU varies due to various factors. Therefore, before implementing measures to improve self-management ability, it is essential to individually evaluate patients and analyze the influencing factors. This evaluation process can help patients enhance their self-management level and provide a more favorable guarantee for treatment and rehabilitation.

Ethical approval

This study was approved by the ethics committee of Shanghai East Hospital (IRB approval number: 2021 (185)).

Conflicts of interest

All contributing authors declare no conflicts of interest.

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