Sakamoto A., Int J Nurs Clin Pract 2026, 13: 449
https://doi.org/10.15344/2394-4978/2026/449

International Journal of Nursing & Clinical Practices

Original Article Open Access

Facilitators and Barriers to Self-Monitoring for the Prevention of Diabetic Foot Complications in Patients with Type 2 Diabetes: Perspectives of Nurses

Aya Sakamoto

Department of Nursing, Kochi Gakuen College, 292-26 asahitenjin-cho, Kochi City, Kochi 780-0955 , Japan

Abstract

This study aimed to identify facilitators and barriers to self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes, as perceived by nurses. Semi-structured interviews were conducted with seven healthcare professionals involved in the care of patients with type 2 diabetes, including certified nurses in wound, ostomy, and continence nursing and certified diabetes nurses. The data were analyzed using a qualitative inductive approach. Four categories of facilitators were identified: awareness of the risk of diabetic foot complications, development of risk awareness through personal experiences, ability to recognize abnormalities and take appropriate action, and support from family members and healthcare professionals for self-monitoring. Four categories of barriers were also identified: limited awareness of the risk of diabetic foot complications, difficulty confronting the disease and abnormalities, reliance on personal judgments and entrenched lifestyle habits, and insufficient supportive relationships to promote proactive self-management. The findings suggest that nurses perceive self-monitoring to be facilitated when patients recognize the risk of diabetic foot complications as a personal concern, develop the ability to recognize changes in their feet, and establish supportive relationships with family members and healthcare professionals. These findings indicate that enhancing patients' risk awareness and attention to their physical condition, building trusting relationships, and establishing support systems involving family members may be important approaches to supporting self-monitoring for the prevention of diabetic foot complications.

Publication History:

Received: October 20, 2026
Accepted: November 04, 2026
Published: November 06, 2026

Keywords:

Type 2 diabetes mellitus; Diabetic foot complications; Self-monitoring

Introduction

Diabetes affects approximately 10 million people in Japan, with a similar number estimated to have prediabetes. Diabetes is a chronic condition that can lead to various complications. Among these, diabetic foot complications may develop as a result of diabetic neuropathy, peripheral arterial disease, and infection, leading to toe deformities, ulcers, and gangrene. In severe cases, lower-limb amputation may be required. According to the International Diabetes Federation's recommendations on the diabetic foot [1], the annual incidence of foot ulcers among people with diabetes in developed countries is approximately 2%, and approximately 1% of people with diabetes undergo lower-limb amputation. Approximately 90% of foot ulcers are associated with neuropathy. These ulcers frequently recur, are difficult to heal, and lead to amputation in 7–20% of cases. Furthermore, people with diabetic foot complications have higher overall mortality rates and significantly higher incidences of cardiovascular and cerebrovascular diseases, depression, and cognitive decline.

According to the Japanese Clinical Practice Guideline for Diabetes 2019 [2], regular foot examinations, glycemic control, and foot care for high-risk patients are strongly recommended (Grade A recommendation) as preventive measures against diabetic foot complications. Early education on preventive foot care is also recommended for all people with diabetes and their families. Regular foot examinations involve comprehensive assessments of foot conditions by healthcare professionals. However, it may be difficult to conduct thorough foot examinations during routine outpatient consultations. Therefore, it is also important for patients to recognize changes in their own feet.

Nevertheless, unlike the hands, the feet are difficult to inspect visually and care for frequently, which can delay appropriate responses to abnormalities. Older age and visual impairment caused by conditions such as diabetic retinopathy may also make appropriate foot care difficult, while neuropathy can reduce the ability to recognize changes in the feet. Preventive foot care generally involves screening, foot care, and education provided by nurses with specialized expertise to high-risk patients. However, support for self-monitoring is necessary for all patients, including those who are not classified as high risk, so that they can recognize changes in their feet and overall physical condition, identify signs of foot complications, and seek appropriate care at an early stage.

Diabetes is a chronic disease, and living with the condition requires patients to manage their disease and treatment proactively while maintaining their daily lives. Self-monitoring has been defined as the regular measurement, recording, and observation of symptoms and bodily sensations to appropriately manage one's health and illness[3]. Within the broader concept of health management, self-monitoring enables individuals to understand their own condition. It represents the first step in self-management and serves as an entry point to health management [4]. Song et al. [5] defined self-monitoring in people

*Corresponding Author: Prof. Aya Sakamoto, Department of Nursing, Kochi Gakuen College, 292-26 asahitenjin-cho, Kochi City, Kochi 780-0955 , Japan.

Citation: Sakamoto A (2026) Facilitators and Barriers to Self-Monitoring for the Prevention of Diabetic Foot Complications in Patients with Type 2 Diabetes: Perspectives of Nurses. Int J Nurs Clin Pract 13: 449. doi: https://doi.org/10.15344/2394-4978/2026/449

Copyright: © 2026 Sakamoto. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

with type 2 diabetes as awareness of, interpretation of, and responses to symptoms specific to the condition, identifying three attributes: awareness, interpretation, and response.

The Japanese Clinical Practice Guideline for Diabetes 2019[2] states that regular foot examinations should include observation of the skin and foot deformities, as well as a comprehensive assessment of neuropathy and impaired blood circulation. The condition of footwear should also be examined, including checking for internal wear, bloodstains, and foreign objects. In self-monitoring, patients need to observe these aspects themselves, recognize abnormalities through their senses (awareness), understand potential risks (interpretation), and seek appropriate assistance from healthcare professionals when necessary (response). Knowledge, awareness, skills, and interest may be considered antecedents necessary to facilitate self-monitoring. Although previous studies have identified factors that facilitate or inhibit self-care, the factors influencing self-monitoring specifically for the prevention of diabetic foot complications have not been sufficiently clarified. Understanding these factors may provide important insights into supporting self-care for foot complication prevention. Therefore, it is important to identify the facilitators and barriers to self-monitoring to inform effective support for patients with type 2 diabetes.

Research Objective

This study aimed to identify the facilitators and barriers to self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes. The findings were expected to provide insights into support strategies for promoting self-monitoring in this population.

Methods

Study design

This study employed a qualitative descriptive design using semi-structured interviews.

Definition of terms

In this study, self-care refers to actions that patients independently undertake to maintain and promote their health and manage their disease. Self-monitoring is one component of self-care and refers to the practice of observing and checking one's own physical condition and health-related indicators and recognizing changes in them.

In this study, self-monitoring for the prevention of foot complications in patients with type 2 diabetes mellitus is defined as the process by which patients, while managing their condition at home, observe the condition of their feet and footwear based on their own standards or indicators, become aware of and interpret changes in the condition of their feet and patient-specific signs, and respond accordingly. Therefore, this study focuses not on self-care for the prevention of foot complications in general, but specifically on observing the condition of the feet and footwear, recognizing changes, and responding to those changes.

Participants

The participants were nurses with at least three years of experience providing foot care to patients with type 2 diabetes.

Access to potential participants

The directors of hospitals and the heads of nursing departments at facilities providing foot care in the Chugoku and Shikoku regions of Japan were informed both verbally and in writing about the purpose, methods, and significance of the study, as well as the ethical considerations involved. After obtaining their agreement to cooperate with the study, the researchers requested referrals of potential participants who met the eligibility criteria and had consented to being contacted by the researchers. The researchers then contacted the potential participants directly and provided verbal and written explanations of the study's purpose, significance, methods, and ethical considerations. Those who expressed willingness to participate and signed the informed consent form were enrolled as research participants.

Data collection methods

The interview guide was developed based on a review of previous studies and the researcher's own nursing practice experience. In developing the questions, the researcher sought opinions from other researchers regarding their relevance to the study objectives and their content, and incorporated these opinions into the guide. No pilot testing was conducted. The interview guide was used during the interviews, and no changes were made to the questions during the interviews. Data were collected through semi-structured interviews conducted by the researcher in a private room at each participant's institution, using the interview guide. Each participant was interviewed for approximately 60 minutes.

During the interviews, participants were asked to recall specific patients whom they perceived as either performing self-monitoring effectively or not performing it effectively, and to describe the characteristics of these patients. When responses lacked specificity, additional questions were asked about the patients' experiences of education regarding diabetic foot complications, knowledge, perceptions of foot complications, interest in their feet, awareness of changes in their feet, awareness of risks, and situations involving reporting to healthcare professionals and taking appropriate action. Participants were also invited to freely describe the support they provided or considered necessary to promote self-monitoring. With the participants' consent, all interviews were audio-recorded using a digital voice recorder. Data were collected from October 2022 to March 2023.

Data analysis methods

The interview data were transcribed verbatim and read repeatedly to deepen the researcher's understanding of the patients with type 2 diabetes mellitus whom the participants had cared for and the circumstances surrounding them. From the transcripts, passages describing the characteristics of patients perceived by the participants as either performing self-monitoring effectively or not performing it effectively were extracted in their original context. These passages were coded to make the characteristics apparent, and labels representing the content of each code were assigned. This process was repeated until an appropriate level of abstraction was achieved. The progression of each category as a process was then examined to identify factors promoting and inhibiting self-monitoring for the prevention of foot complications, as well as support to promote self-monitoring. Codes with similar meanings across cases were grouped and categorized. Throughout the analysis, the researcher continually returned to the original data to examine the validity of the interpretations.

Ethical considerations

The purpose, significance, and methods of the study were explained in writing and orally to the participating institutions and research participants. The explanations also addressed voluntary participation, the right to withdraw at any stage, privacy protection, and measures to minimize physical and psychological burden. The study was conducted after obtaining approval from the Research Ethics Committee of the University of Kochi (Approval No. Nursing Research Ethics 22–52) and the ethics review committee of each participating institution.

Results

Characteristics of the research participants (Table 1)

The research participants were seven women with a mean of 21 years of nursing experience. Their experience in foot care ranged from 5 to 20 years. Their qualifications included Certified Nurses in Skin/Wound, Ostomy and Continence Nursing, Certified Nurses in Diabetes Nursing, and Diabetes Educators. The interviews lasted a mean of 92.5 minutes (range: 24–66 minutes), and each participant was interviewed once or twice.

Factors perceived by nurses as facilitating and inhibiting self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes mellitus

Factors perceived by nurses as facilitating self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes mellitus

The analysis identified four categories comprising 13 subcategories: 【Awareness of the risk of diabetic foot complications】, 【Development of risk awareness through personal experiences】, 【Ability to recognize abnormalities and take appropriate action】, and 【Support from family members and healthcare professionals for self-monitoring】(Table 2).

【Awareness of the risk of diabetic foot complications】

This category comprised five subcategories: ＜Taking an interest in one's body and valuing one's health＞, ＜Incorporating information about the feet into one's own situation＞, ＜Recognizing one's own situation as complications progress＞, ＜Recognizing the importance of foot observation through the experiences of people with neuropathy＞, and ＜Recognizing the need for prevention by hearing about others' experiences＞.

Table 1: Characteristics of the Study Participants.

Case	Age	Sex	"Years of Nursing Experience"	"Years of Foot Care Experience"	Qualification
A	40s	Female	19	6	"Certified Nurse in Wound, Ostomy, and Continence Nursing"
B	50s	Female	30	5	Certified Diabetes Educator
C	50s	Female	22	6	Certified Diabetes Educator
D	50s	Female	23	17	Certified Diabetes Educator
E	30s	Female	13	8	Certified Diabetes Educator
F	40s	Female	22	20	Certified Nurse in Diabetes Nursing
G	40s	Female	19	10	Certified Diabetes Educator

Table 2: Factors Facilitating Self-Monitoring.

Category	Subcategory
Awareness of the risk of diabetic foot complications	Taking an interest in one's body and valuing one's health
	Incorporating information about the feet into one's own situation
	Recognizing one's own situation as complications progress
	Recognizing the importance of foot observation through the experiences of people with neuropathy
	Recognizing the need for prevention by hearing about others' experiences
Development of risk awareness through personal experiences	Changing perceptions of the feet through experiences of treatment
	Paying attention to minor wounds after experiencing amputation resulting from a small wound
Ability to recognize abnormalities and take appropriate action	Detecting abnormalities and taking appropriate action independently
Support from family members and healthcare professionals for self-monitoring	Family members detecting abnormalities by checking the feet
	Family members recognizing symptoms and prompting consultation
	Paying attention to the feet because they are examined during outpatient visits
	Observing and maintaining foot hygiene because nurses trim the toenails
	Reporting changes in the feet voluntarily when a trusting relationship with healthcare professionals has been established

This category described how patients' awareness of the risk of diabetic foot complications was fostered when they regarded knowledge and experiences related to foot lesions and diabetes as personally relevant, thereby encouraging self-monitoring-For example, Case A stated:"People who can carefully evaluate the information they receive and determine what they need-for example, recognizing that their own feet are at high risk of severe complications and that certain measures are necessary and incorporate that information into their own lives may be the people who are able to engage in self-monitoring." The nurse perceived that patients were more likely to engage in self-monitoring when they recognized knowledge and experiences related to diabetic foot complications and diabetes as relevant to their own circumstances.

【Development of risk awareness through personal experiences】

This category comprised two subcategories: < Changing perceptions of the feet through experiences of treatment > and < Paying attention to minor wounds after experiencing amputation resulting from a small wound > .

Patients recognized the importance of preventing foot problems through distressing experiences associated with diabetic foot complications. For example, Case F stated:"People who come in with burns may not notice them because they cannot feel pain. Those who have had such experiences to some extent become motivated and realize, 'Oh, this is why it is dangerous.' For example, people who have suffered burns, whose wounds did not heal or were slow to heal, or who found that their feet had been cut without their noticing because they felt no pain-those who recognize these experiences seem to become motivated and understand why self-care is necessary. Based on my experience, I feel that they develop an awareness of the need for self-monitoring. "Case A also stated:"People can draw on their own experiences with diabetic foot complications. For example, they may remember that their feet became discolored previously and realize that they need to seek medical attention early. Or they may have developed an infection from a small burn and subsequently lost a toe, leading them to recognize the need to pay attention to even minor wounds as early as possible. Previously, they may have removed the skin over a callus, allowing bacteria to enter. They treated it themselves with an adhesive bandage, but the condition worsened. Through that experience, they learned not to remove calluses themselves. I feel that people who develop their own ways of managing their feet based on their experiences are able to engage effectively in self-monitoring." The nurses perceived that patients' experiences of receiving treatment and of severe complications could serve as turning points that heightened their awareness of the importance of preventing foot lesions.

【Ability to recognize abnormalities and take appropriate action】

This category comprised one subcategory: < Detecting abnormalities and taking appropriate action independently > .

This category described patients' ability to recognize foot abnormalities at an early stage and respond to them. Depending on their symptoms, patients adopted their own approaches, such as applying adhesive bandages or disinfecting the affected area, or sought medical attention. For example, Case A stated:"People can draw on their own experiences with foot lesions. For example, they may remember that their feet became discolored previously and realize that they need to seek medical attention early. Or they may have developed an infection from a small burn and subsequently lost a toe, leading them to recognize the need to pay attention to even minor wounds as early as possible. Previously, they may have removed the skin over a callus, allowing bacteria to enter. They treated it themselves with an adhesive bandage, but the condition worsened. Through that experience, they learned not to remove calluses themselves. I feel that people who develop their own ways of managing their feet based on their experiences are able to engage effectively in self-monitoring. "The nurse perceived that patients' ability to recognize foot abnormalities and respond to them facilitated self-monitoring. Case A further stated:"December is a time when people whose jobs place considerable strain on their feet are more likely to experience increased stress on their feet. For example, the volume and frequency of deliveries increase for people working at cake shops or fruit shops. For self-employed people working in greenhouses, their foot conditions may worsen depending on the growing season. They understand that their feet are more likely to deteriorate during certain periods, so they inspect them quite frequently. If they think something is wrong-for example, if there is more discharge than usual or the redness has increased-they come to see us." The nurse perceived that patients' ability to recognize changes in their feet, particularly those associated with their work and daily activities, and to seek medical attention when necessary facilitated self-monitoring.

【Support from family members and healthcare professionals for self-monitoring】

This category comprised five subcategories: < Family members detecting abnormalities by checking the feet > , < Family members recognizing symptoms and prompting consultation > , < Paying attention to the feet because they are examined during outpatient visits > , < Observing and maintaining foot hygiene because nurses trim the toenails > , and < Reporting changes in the feet voluntarily when a trusting relationship with healthcare professionals has been established > .

This category described how family members' involvement in inspecting patients' feet helped identify changes. Family members also supported appropriate responses, such as contacting healthcare professionals by telephone or reporting problems during outpatient visits when symptoms such as pain caused by ingrown toenails occurred. For example, Case D stated:"Some patients have daughters or other family members who support them. I feel that patients whose family members are cooperative and regularly check their feet tend to be quite good at self-monitoring. Some people living alone also manage their feet properly, but my impression is that there is a considerable difference between having someone in the family or another supportive person and not having such support." The nurse described how family members' involvement in checking patients' feet helped them recognize foot problems early and seek outpatient care. Case B also stated: "Because they have to take off their shoes and socks, their toenails will be seen. So they start paying attention to their feet themselves, making sure they have washed them properly or trimmed their nails before coming. I think the fact that their feet will be examined has a positive effect in itself." The nurse explained that patients became more attentive to foot care because nurses examined their feet and provided treatment and care during consultations. These findings suggest that nurses perceived relationships with family members and healthcare professionals as supporting patients' interest in their feet and their foot-monitoring behaviors.

Factors perceived by nurses as inhibiting self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes mellitus

The factors inhibiting self-monitoring were consolidated into four categories comprising 10 subcategories: 【Limited awareness of the

risk of diabetic foot complications】, 【Difficulty confronting the disease and abnormalities】, 【Reliance on personal judgments and entrenched lifestyle habits】,and 【Insufficient supportive relationships to promote proactive self-management】 (Table 3).

【Limited awareness of the risk of diabetic foot complications】

This category comprised three subcategories: < Inability to take appropriate action due to insufficient knowledge about the feet > , < Failure to remember information about the feet when no foot symptoms are present > ,and < Fear of a diabetes diagnosis and failure to acknowledge the disease as a personal concern > .

Patients either lacked knowledge about diabetes and why they needed to inspect their feet, or remembered information about diet and exercise but did not understand the importance of foot care because they had not experienced any foot symptoms. For example, Case E stated:"Some patients probably do attend diabetes outpatient clinics, but I wonder whether they can recognize abnormalities in their feet or inspect them properly. Quite a few people receive medication for diabetes but do not really understand what kind of disease it is. Some say, 'I didn't know I had to check my feet, too,' or 'I had heard that diabetes could lead to kidney problems and dialysis, but why do I need to check my feet and eyes as well?'" The nurse perceived that insufficient understanding of the risks associated with diabetes and foot lesions, as well as difficulty recognizing these risks as personally relevant, hindered patients' engagement in self-monitoring.

【Difficulty confronting the disease and abnormalities】

This category comprised two subcategories: < Being afraid to look at a changing wound and unable to contact healthcare professionals > and < Taking an overly optimistic view of abnormalities and not seeking medical attention > .

Some patients had acquired knowledge about diabetic foot complications through family members' experiences and understood that they themselves were at risk. Nevertheless, they regarded the risk as something that would not happen to them. Others were afraid to look at changes in their wounds and were unable to contact healthcare professionals. Consequently, their awareness did not translate into appropriate action. For example, Case A stated: "Most of the patients were diagnosed with diabetes when their foot lesions were discovered. Some had already learned a great deal about the condition through their fathers' or other family members' experiences, including accompanying them to medical appointments. They knew that diabetes could lead to diabetic foot complications, but two patients still seemed to think, somewhere in the back of their minds, 'This would never happen to me.' Their fathers had experienced foot lesions as well, but they did not relate those experiences to themselves, and their medical consultations were delayed." The nurse described how patients could possess knowledge about diabetic foot complications and their risk factors yet fail to recognize their own vulnerability. In some cases, diabetes was diagnosed only after diabetic foot complications had developed.

Case B also stated: "I saw a patient whose toe was already moving upward so much that even the part with the toenail was pointing downward. Just looking at it, I knew something was seriously wrong, so I immediately informed the physician and referred the patient. After the patient was transferred, they developed sepsis and died within a few days. There were other patients who were afraid to seek medical attention and could not accept their diabetes, so they hesitated to seek care. Perhaps having a family member who had experienced something similar made them even more frightened." The nurses perceived that anxiety about disease progression, denial, and overly optimistic interpretations of symptoms could prevent patients from taking appropriate action even when they recognized abnormalities.

【Reliance on personal judgments and entrenched lifestyle habits】

This category comprised two subcategories: < Difficulty changing established everyday habits > and < Worsening symptoms due to self-directed assessment and treatment > .

Because washing the feet was an ordinary daily activity, patients found it difficult to consciously inspect the soles of their feet and the spaces between their toes. In addition, some patients assessed their foot wounds and treated them according to their own judgment,

Table 3: Factors Inhibiting Self-Monitoring.

Category	Subcategory
Limited awareness of the risk of diabetic foot complications	Inability to take appropriate action due to insufficient knowledge about the feet
	Failure to remember information about the feet when no foot symptoms are present
	Fear of a diabetes diagnosis and failure to acknowledge the disease as a personal concern
Difficulty confronting the disease and abnormalities	Being afraid to look at a changing wound and unable to contact healthcare professionals
	Taking an overly optimistic view of abnormalities and not seeking medical attention
Reliance on personal judgments and entrenched lifestyle habits	Difficulty changing established everyday habits
	Worsening symptoms due to self-directed assessment and treatment
Insufficient supportive relationships to promote proactive self-management	Relying on healthcare professionals and failing to achieve established goals
	Not engaging in self-management because of the belief that the hospital will provide treatment
	Difficulty establishing relationships due to keeping healthcare professionals at a distance

resulting in worsening symptoms. For example, Case A stated: "The surface of the wound had turned pink, so the patient thought there was no problem. In their own way, they seemed to have assessed the wound carefully. However, they apparently left a hydrocolloid dressing on for about three days without changing it. They had gone to the pharmacy, read the instructions for the dressing, and applied it because they thought it would heal the wound. Their wife noticed something was wrong, and when she removed the dressing, she realized that something was not right." The nurse perceived that long-established lifestyle habits and patients' reliance on their own judgments could take precedence over appropriate foot inspection and care, thereby hindering self-monitoring and appropriate responses to abnormalities.

【Insufficient supportive relationships to promote proactive self-management】

This category comprised three subcategories: < Relying on healthcare professionals and failing to achieve established goals > , < Not engaging in self-management because of the belief that the hospital will provide treatment > , and < Difficulty establishing relationships due to keeping healthcare professionals at a distance > .

Although self-care requires patients to take responsibility for their own health management, some patients expected the hospital to treat their condition and therefore did not engage in self-monitoring. Others maintained a certain distance from nurses, making it difficult to establish relationships that would support them in taking autonomous action. For example, Case G stated: "Many patients come primarily to have their toenails trimmed because they cannot cut them themselves. Even when we use foot care visits as an opportunity to discuss other aspects of their daily self-management, many patients do not actually put what we discuss into practice. Even when they set goals, they often have difficulty achieving them." The nurse explained that patients who attended outpatient foot care clinics primarily to have their toenails trimmed sometimes did not carry out foot care independently at home.

Case A also stated: "Patients who are not employed may not seem particularly interested in their wounds. At least, based on the patients I have seen, there seem to be fewer behaviors or statements that indicate an interest in their wounds. However, they probably are interested, but many seem to keep their distance or put up some kind of barrier. (Omitted.) When you listen to them more closely, you sometimes find that they do not have enough money but feel too embarrassed to say so." The nurse described how some patients appeared to show little interest in their wounds through their behaviors or statements. However, underlying reasons, such as financial difficulties and embarrassment about disclosing them, might lead patients to keep their distance from nurses, making it difficult for them to accept further support and take autonomous action. The nurses perceived that patients' limited development of autonomy in self-management and the absence of trusting relationships with healthcare professionals hindered the continuation of self-monitoring.

Discussion

Characteristics of factors perceived by nurses as facilitating self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes mellitus

This study identified four categories of factors perceived by nurses as facilitating self-monitoring for the prevention of foot lesions in patients with type 2 diabetes mellitus:【Awareness of the risk of diabetic foot complications】,【Development of risk awareness through personal experiences】,【Ability to recognize abnormalities and take appropriate action】, and【Support from family members and healthcare professionals for self-monitoring】.

Self-care behaviors related to the prevention of diabetic foot complications were associated not only with knowledge of foot care but also with how patients perceived the risks of diabetes and diabetic foot complications. Murakami et al.[6] suggested that acquiring knowledge and skills related to diabetes and engaging in daily self-reflection during disease management could promote the implementation of self-care behaviors. Coffey et al. [7] demonstrated that integrating patients' perceptions and experiences of diabetic foot complications with their knowledge, attitudes, and behaviors regarding foot lesion prevention was associated with engagement in foot care. Hill et al. [8] reported that personal and family experiences of diabetes-related health problems could motivate patients to engage in foot care, whereas failure to recognize the risk of diabetic foot complications as personally relevant could make preventive behaviors less likely. They further suggested that motivation for self-care increased when patients' experiences were consistent with information provided by healthcare professionals.

In the present study, nurses perceived that self-monitoring was facilitated when patients critically evaluated information and incorporated an understanding of their risk of severe complications into their own lives, or when the progression of complications helped them recognize their own health circumstances and perceive the risk of diabetic foot complications as a personal concern. These findings suggest that patients' knowledge of diabetic foot complications and their personal experiences of complications may have strengthened their motivation for self-care when these experiences aligned with information provided by healthcare professionals. Nurses also perceived that witnessing diabetic foot complications or amputations experienced by family members or acquaintances could help patients acquire knowledge about foot lesion prevention and translate that knowledge into preventive behaviors.These findings suggest that regarding knowledge and experiences related to diabetes and diabetic foot complications as personally relevant is important in promoting foot inspection. Therefore, promoting self-monitoring for the prevention of diabetic foot complications requires more than simply providing information. Nurses need to support patients in understanding the risks of diabetes and diabetic foot complications in relation to their own circumstances and in recognizing the importance of regular foot inspection in their daily lives.

To promote self-monitoring for the prevention of diabetic foot complications, patients need not only to recognize abnormalities in their feet but also to understand the significance of these changes and respond appropriately. Crocker et al.[9] reported that patients with diabetes may perceive changes in their feet through sensory experiences but fail to understand their clinical significance, potentially delaying medical consultation. Bossman et al. [10] also found that patients who had experienced abnormal sensations or symptoms in their feet tended to pay greater attention to foot-related problems. In the present study, nurses perceived that patients noticed changes such as swelling, pain, and discharge and subsequently sought medical attention when they considered it necessary. Some patients also drew on previous experiences of diabetic foot complications to recognize the need for early consultation when changes, such as discoloration of the feet, occurred. The nurses considered that self-monitoring was facilitated by patients' ability to observe changes in foot color, wounds, swelling, and sensation; understand whether these changes represented

abnormalities requiring action; perform appropriate foot care; and consult healthcare professionals when necessary. These findings suggest that promoting foot self-monitoring requires nurses to help patients acquire practical skills for inspecting their feet, understand the criteria for identifying abnormalities, and learn how to respond appropriately when abnormalities are detected.

In the prevention of diabetic foot lesions, self-monitoring is supported not only by patients' own knowledge and motivation but also by their relationships with family members and healthcare professionals. Reaney et al. [11] reported that spouses' perceptions and behaviors influenced patients' own foot care behaviors. Hill et al. [8] also indicated that connecting patients' personal experiences with information provided by healthcare professionals could support motivation for foot self-care. In the present study, nurses perceived that family members' identification of potentially worsening wounds, patients' increased attention to their feet when nurses examined them during outpatient visits, and patients' voluntary reporting of changes in their feet when trusting relationships with healthcare professionals had been established were associated with self-monitoring. The nurses interpreted these behaviors as reflecting patients' engagement in foot self-monitoring at home.

A particular challenge in diabetic foot care is that patients may not readily recognize abnormalities because of sensory impairment, the absence of noticeable symptoms, or difficulty seeing their feet. Consequently, support may need to be provided on the premise that patients may be unable to detect certain abnormalities on their own. In such circumstances, observation by family members or other people and support for establishing regular foot inspection routines may be particularly important. These findings suggest that family members can support self-monitoring by taking an interest in patients' foot conditions, assisting with foot inspection, and reminding patients to check their feet. Healthcare professionals can also support continued engagement in self-monitoring by providing specific guidance on foot inspection and responses to abnormalities according to each patient's level of understanding and living circumstances.

Overall, the nurses in this study perceived that self-monitoring among patients with type 2 diabetes mellitus was supported by patients recognizing the risk of diabetic foot complications as personally relevant, developing the ability to recognize changes in their feet, and engaging in self-management autonomously within supportive relationships with family members and healthcare professionals.

Characteristics of factors perceived by nurses as inhibiting self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes mellitus

This study identified four categories of factors perceived by nurses as inhibiting self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes mellitus: 【Limited awareness of the risk of diabetic foot complications】, 【Difficulty confronting the disease and abnormalities】, 【Reliance on personal judgments and entrenched lifestyle habits】,and 【Insufficient supportive relationships to promote proactive self-management】.

Insufficient knowledge and information about diabetic foot complications can inhibit preventive self-monitoring in patients with diabetes. Sari et al. [12] identified inadequate knowledge of foot care and underestimation of the risk of diabetic foot complications as barriers to foot care. Hill et al. [8] also demonstrated that connecting patients' personal experiences experiences with information provided by healthcare professionals could support motivation for foot self-care. In the present study, nurses perceived that limited awareness of the risk of foot lesions inhibited self-monitoring. Some patients did not understand the nature of diabetes or why they needed to inspect their feet. Others did not recognize the importance of foot care before symptoms appeared. These findings suggest that when patients lack accurate knowledge about diabetic foot complications and do not understand the need for prevention, they may be less likely to recognize the importance of foot inspection or engage in self-monitoring. Furthermore, nurses perceived that fear of diabetic foot complications and difficulty obtaining necessary information could make it difficult for patients to confront their diabetes. Under these circumstances, patients may find it difficult to accept diabetes and the associated risks as personal concerns and to participate actively in treatment and self-management.

In the present study, nurses also perceived that patients' own assessments of their foot conditions and their decisions that no problem existed could inhibit self-monitoring. Gale et al. [13] reported that some patients with type 2 diabetes had an insufficient understanding of foot ulcers and difficulties associated with wound healing, and that some based their foot care practices on perceptions that differed from medical evidence. Crocker et al. [9] similarly indicated that even when patients inspect their feet, insufficient understanding of the significance of changes may delay appropriate responses. These findings suggest that establishing a habit of foot inspection does not necessarily lead to appropriate action if patients do not correctly understand the risks of diabetes-related diabetic foot complications or the significance of abnormalities. Furthermore, even when patients understand the importance of diabetes self-management, changing established lifestyle habits may be difficult. Mogre et al. [14] reported that difficulties in changing existing habits and insufficient motivation to exercise were among the factors inhibiting diabetes self-care. In the present study, nurses perceived that patients often did not inspect the soles of their feet or the spaces between their toes and that changing behaviors that had long been part of their daily routines was difficult. Therefore, preventing diabetic foot complications requires more than providing accurate knowledge. Nurses need to support patients in accurately assessing their foot conditions and maintaining feasible foot care practices as part of their daily lives.

This study also identified difficulty opening up to healthcare professionals and discussing concerns about self-care or difficulties in daily life as factors inhibiting self-monitoring. Zhu et al. [15] reported that communication problems with healthcare professionals and financial burdens were barriers to self-management of diabetic foot ulcers, highlighting the importance of individualized support and social support tailored to patients' circumstances. Peltola et al. [16] also reported that relationships with healthcare professionals and communication practices could either facilitate or inhibit patients' self-management. These findings suggest that when patients are unable to discuss financial burdens or difficulties in their daily lives with healthcare professionals, they may not receive support tailored to their actual circumstances, making it difficult to implement recommended self-care practices. Therefore, promoting self-monitoring requires healthcare professionals not only to provide knowledge and instructions but also to establish relationships in which patients feel comfortable expressing their concerns and preferences and can work collaboratively with healthcare professionals to identify self-management strategies suited to their living circumstances. In the present study, nurses also perceived that some patients relied on healthcare professionals to manage their conditions rather than

undertaking self-management themselves, did not recognize the need for self-care, or were reluctant to engage in it. Thus, the inhibiting factors extended beyond patients' difficulty opening up to healthcare professionals to include difficulties in accepting responsibility for their own self-management and working collaboratively with healthcare professionals.

Implications for Nursing Practice

The facilitating factors for self-monitoring in patients with type 2 diabetes mellitus, as perceived by nurses in this study, can be organized into two broad dimensions: individual factors and interpersonal and social factors. Individual factors include risk awareness, risk awareness arising from personal experiences, the ability to recognize abnormalities, and autonomy in self-management. Interpersonal and social factors include family support, support from healthcare professionals, and trusting relationships. Among the individual factors, risk awareness and awareness of the potential consequences of foot lesions may motivate patients to initiate self-care behaviors. The ability to recognize abnormalities may improve the quality of daily foot inspection, while autonomy in self-management may support the continuation of regular self-monitoring. When patients' ability to recognize abnormalities is limited by older age, impaired vision, or restricted joint range of motion, family members may help by inspecting the soles of their feet on their behalf. Family members can also support patients in maintaining daily foot inspection and care routines. Healthcare professionals, in turn, can teach patients what to look for when inspecting their feet and help improve their ability to recognize abnormalities. They can also provide accessible consultation opportunities and establish care pathways that enable patients to receive prompt medical assessment and treatment when abnormalities are detected. Furthermore, positive relationships with family members and healthcare professionals can foster a sense of security and trust. Such relationships may help patients report even minor abnormalities without concealing them, thereby facilitating early reporting and timely medical consultation. These findings suggest that self-monitoring for the prevention of diabetic foot complications does not depend solely on individual patient factors. Rather, interpersonal and social factors may complement and strengthen individual capacities for self-monitoring.

Taken together, the findings suggest that supporting patients in developing awareness of risk and interest in their own physical condition, while establishing trusting relationships and support systems involving family members, may be important approaches to promoting self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes mellitus.

Limitations and Future Directions

This study identified factors promoting and inhibiting self-monitoring for the prevention of foot complications in patients with type 2 diabetes mellitus from the perspective of nurses. Therefore, the findings reflect nurses' perceptions of patients' behaviors based on their clinical experiences and the factors they considered to influence those behaviors; they do not represent patients' own perceptions or experiences directly. Accordingly, nurses' perceptions may not necessarily correspond to patients' own perceptions and experiences. Future research should involve patients themselves and compare their perspectives with the findings obtained from nurses to examine the factors promoting and inhibiting self-monitoring from multiple perspectives.

Conclusion

This qualitative study aimed to clarify the factors perceived by nurses as facilitating and inhibiting self-monitoring for the prevention of diabetic foot complications in patients with type 2 diabetes mellitus. Four categories of facilitating factors were identified: Awareness of the risk of diabetic foot complications】,【Development of risk awareness through personal experiences】,【Ability to recognize abnormalities and take appropriate action】, and【Support from family members and healthcare professionals for self-monitoring】. Four categories of inhibiting factors were also identified:【Limited awareness of the risk of diabetic foot complications】,【Difficulty confronting the disease and abnormalities】,【Reliance on personal judgments and entrenched lifestyle habits】, and【Insufficient supportive relationships to promote proactive self-management】. These findings suggest that self-monitoring for the prevention of diabetic foot lesions does not depend solely on individual patient factors; rather, interpersonal and social factors complement and strengthen individual factors. The findings further suggest that important approaches to supporting self-monitoring in patients with type 2 diabetes mellitus include helping patients develop awareness of risk and greater interest in their own physical condition, establishing trusting relationships, and developing support systems that involve family members.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Acknowledgments

The authors would like to express their sincere gratitude to the administrators of the participating institutions for granting permission to conduct this study and to the research participants for sharing their experiences and perspectives on self-monitoring.

Funding

This study was supported by a Grant-in-Aid for Scientific Research (C) from the Ministry of Education, Culture, Sports, Science and Technology of Japan (Grant No. 21K10695).

References

1. International Diabetes Federation (2017) IDF Clinical Practice Recommendations on the Diabetic Foot: A Guide for Health Care Professionals.
2. Japanese Diabetes Society (Ed.). (2019) Japanese Clinical Practice Guideline for Diabetes 2019. Tokyo: Nankodo.
3. Wilde MH, Garvin S (2007) A concept analysis of self-monitoring. J Adv Nurs 57: 339–350.
4. Hattori Y, Taru C, Miyawaki I (2010) Concept analysis of self-monitoring in patients with heart failure. Journal of Japan Academy of Nursing Science, 30: 74–82.
5. Song M, Lipman TH (2008) Concept analysis: self-monitoring in type 2 diabetes mellitus. Int J Nurs Stud 45: 1700-1710.
6. Reshma P, Rajkumar E, John R, George AJ (2021) Factors influencing self-care behavior of socio-economically disadvantaged diabetic patients: A systematic review. Health Psychol Open 8: 20551029211041427.
7. Coffey L, Mahon C, Gallagher P (2019) Perceptions and experiences of diabetic foot ulceration and foot care in people with diabetes: A qualitative meta-synthesis. Int Wound J 16: 183-210.
8. Hill A, Ellis M, Gillison F (2022) Qualitative exploration of patient and healthcare professional perspectives on barriers and facilitators to foot self-care behaviors in diabetes. BMJ Open Diabetes Res Care 10: e003034.

9. Crocker RM, Tan TW, Palmer KNB, Marrero DG (2022) The patient's perspective of diabetic foot ulceration: A phenomenological exploration of causes, detection, and care-seeking. J Adv Nurs 78: 2482-2494.

10. Bossman IF, Dare S, Oduro BA, Baffour PK, Hinneh TK, et al. (2021) Patients' knowledge of diabetes foot complications and self-management practices in Ghana: A phenomenological study. PLOS ONE 16: e0256417.

11. Reaney M, Nik Chmiel, Churchill S (2018) Foot care, 'spousal' support and type 2 diabetes: an exploratory qualitative study. Psychol Health 33: 1191-1207.

12. Sari Y, Yusuf S, Haryanto H, Sumeru A, Saryono S (2022) The barriers and facilitators of foot care practices in diabetic patients in Indonesia: A qualitative study. Nursing Open 9: 2867-2877.

13. Gale L, vedhara K, Searle A, Kemple T, Campbell R (2008) Patients' perspectives on foot complications in type 2 diabetes: a qualitative study. Br J General Pract 58: 555–563.

14. Mogre V, Johnson NA, Tzelepis F, Paul C (2019) Barriers to diabetic self-care: A qualitative study of patients' and healthcare providers' perspectives. J Clin Nurs 28: 2296-2308.

15. Zhu X, Lee ES, Lim PXH, Chen YC, Chan FHF, et al. (2023) Exploring barriers and enablers of self-management behaviours in patients with diabetic foot ulcers: A qualitative study from the perceptions of patients, caregivers, and healthcare professionals in primary care. Int Wound J 20: 2764–2779.

16. Peltola M, Isotalus P, Astedt-Kurki P (2018) Patients' Interpersonal Communication Experiences in the Context of Type 2 Diabetes Care, Qualitative Health Research 28: 1267-1282.

17. Hill A, Ellis M, Gillison F (2022) Qualitative exploration of patient and healthcare professional perspectives on barriers and facilitators to foot self-care behaviors in diabetes. BMJ Open Diabetes Res Care 10: e003034.