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# Diabetic Foot Ulcer Patients' Uncertainty Regarding Their Prognosis

## *A Q-Methodological Study*

Ye-Na Lee ◆ Sung Ok Chang

**ABSTRACT**

**PURPOSE:** The purpose of this qualitative study was to identify the subjective patient perspectives toward the uncertainty regarding diabetic foot ulcer (DFU) prognosis.

**DESIGN:** Q-methodology, which is a qualitative method for analyzing subjective viewpoints, was used.

**SUBJECTS AND SETTING:** Forty patients with DFUs who were admitted to the diabetic wound center of a university hospital in Seoul, South Korea.

**METHODS:** Data were collected on the subjective viewpoint of patients regarding their DFU prognosis uncertainty and analyzed by the software program PQMethod 2.35 using a principal component analysis and varimax rotation.

**RESULTS:** This study revealed 4 factors characterizing patient subjective experience related to DFU prognosis: confusion from a lack of knowledge, concerns about a negative future, overdependence on information, and expectations for a positive outlook about favorable results.

**CONCLUSION:** The findings of this study suggest various intervention methods for patients with DFU facing uncertainty about their prognosis based on the 4 viewpoints identified. The identification of the factor causing uncertainty and integration of all uncertainty factors are expected to be used as the basis for reducing patients' uncertainty and helping nurses care for patients more effectively.

**KEY WORDS:** Diabetic foot ulcer, Nursing, Q-methodology, Uncertainty.

## INTRODUCTION

Diabetic foot ulcers (DFUs) are highly correlated with lower extremity amputation and are associated with high utilization of health care[1] and often result in lifelong physical disabilities.[2] These ulcers also lead to psychological conditions including anxiety, depression, and uncertainty toward the future.[3-5] The treatment of DFUs requires consistent visits to health care specialists and ongoing preventive self-management; unfortunately recurrence rates are high.[6,7] To prevent DFU recurrence, patients are instructed to manage their diabetes through close health monitoring including blood pressure and diet, and engage in physical activity for the rest of their lives.[8,9]

Patients who suffer from chronic conditions and DFUs experience additional psychological stress when they are unable to accurately perceive the negative sequelae resulting from their chronic condition or are unable to internalize treatment or prognosis; thus, many individuals are uncertain about their long-term prognosis.[10,11]

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Research relating to disease uncertainty, defined as the inability to determine the meaning of illness-related events, influences patients' quality of life. Nurses working with patients with chronic conditions are often unaware of the feelings of uncertainty faced by their patients.[12] Despite DFU requiring many patients to undergo frequent surgical procedures and live with the threat of a potential impending amputation, many patients are uncertain about their prognosis. Borrowing from the theory of uncertainty, factors that influence how patients and their families view their condition include the perception of illness, the familiarity with the illness, communication, information, and social aspects that aid in problem-solving, and trust in the health care team.[10,13-16] According to the theory as modified by Mishel, the concept of uncertainty explains how an individual or family, who experiences a state of confusion or chaos that is difficult to undo or change, comes to terms with such a state and progresses toward growth.[10,13-17] Uncertainty presents an important concept in nursing, and therefore identifying its presence with regard to the prognosis of illness for patients with DFU is important to implement appropriate nursing interventions. To understand these complexities and to advance a more comprehensive understanding of uncertainty, studies of human subjectivity, which explore the viewpoint of patients' perceptions, experiences, expectations and personal understandings of external phenomena such as uncertainly, are needed. Moreover, uncertainty toward prognosis is a concept in which understanding the individual consciousness and cognitive perspective is critical. Unfortunately, descriptive study

designs limit the identification of factors from a patient's viewpoint; thus, methodologies that employ qualitative approaches are needed, such as Q-methodology.[6,18-20]

The philosophical underpinnings of Q-methodology "externally explain" human psychological characteristics and espouse an understanding "from within." The foundations begin from the perspective of the doer (the patient), not from the assumptions of the researcher, and focus on internal meanings of the individual rather than individual differences between people.[21-28] Moreover, the method is appropriate when focusing on individual subjectivity or attitudes instead of abilities or objective behavior. Thus, we selected Q-methodology to explore and explain subjective patient viewpoints of uncertainty toward their DFU prognosis.

## METHODS

### Overview of Study Design

Q-methodology as a research method is used in nursing, psychology, and social sciences to study viewpoints, and is characterized by ascertaining the diverse range of subjectivity from individuals within a group.[21-28] The name "Q" comes from the form of factor analysis that is used to analyze the data. Normal factor analysis, called the R method, involves finding correlations between variables across a sample of individuals and reduces data to key factors, which are claimed to represent shared ways of thinking.[26-28] Q-methodology generally has 5 steps:

1. *Formation of a Q-concourse,* a list of statements from interviews
2. *Selection of a Q-sample,* a final set of statements from the Q-population
3. *Selection of a P-sample,* the participants with which to sort the Q-sample
4. *The Q-sorting process,* the sorting of the Q-samples by the P-sample
5. *The factor analysis* using PQ software *and labeling* the factors

### Sample and Setting

Participants were hospitalized or outpatients being treated in a diabetic wound center of a university hospital in Seoul, South Korea. Inclusion criteria were being able to understand Korean language and having a DFU while exclusion criteria included diagnosis of a mental disorder such as depression or had difficulty communicating.

### Ethical Considerations

This study took place after receiving approval from the Institutional Review Board (KUGH12089). The purpose of the study was explained by the researcher (Y.L.), who provided an overview of the study and all studies procedure, and obtained written consent prior to participant enrollment.

### Sample Size Determination

For Q-methodology, the number of participants is not established a priori. The emphasis is on how well the participants reflect their group's viewpoints such that the objectivity of responses depends on how well each "different" point of view is represented, rather than the number or proportion of responses. For this method, a larger P-sample actually leads to a lower clarity of the characteristics exhibited within a group because multiple individuals represent 1 factor.[21,22,28] Therefore, small sample sizes are the norm.

### Study Procedures

#### Step 1: Formation of a Q-Concourse

We developed a list of statements that represented the total range of perspectives, called the Q-concourse from a literature review and in-depth interviews of patients with DFUs to identify the uncertainty factors related to their prognosis. To reduce researcher-induced bias, semistructured interviews were conducted with questions divided into 4 theoretical categories derived from the theory of uncertainty. These included ambiguity, complexity, volatility, and unpredictability.[13-17] Interviews were conducted to the point of theoretical saturation, meaning that the researcher (Y.L.) continued to interview until there were no new data obtained from the participants. The interview transcripts were repeatedly read and analyzed to identify the subjective meaning, thinking, and emotions toward the uncertainty regarding the prognosis of illness, and from these interviews, a Q-concourse of 53 statements was derived.

#### Step 2: Selection of a Q-Sample

The Q-samples were reconstructed by researchers (S.C., Y.L.) separating and selectively deleting those containing 2 or more viewpoints in 1 Q-concourse statement. Next, the Q-sample extraction and categorization processes were modified and reviewed by researchers (S.C., Y.L.) through a nonstructured sampling process that randomly selected a statement thought to best represent the category derived from the theory of uncertainty from the Q-concourse.[26] After review, a total of 30 statements were included in the Q-sample.

#### Step 3: Selection of a P-Sample

The P-sample refers to the study participants who engage in the Q-sorting process.[26] Forty individuals who were patients of the diabetic wound center of a university hospital in South Korea between May and October 2013 were approached, and enrolled in the P-sample.

#### Step 4: The Q-Sorting Process

The P-sample participants were given an explanation of the study purpose and card sorting process prior to the Q-sorting activity. The 30 statements derived in step 2 were printed on cards, with each card containing 1 statement. During sorting, the participants were asked to refer to the Q-sorting instructions and lay out the cards in a pyramid format on a table (Figure 1). Q-sorting occurred as each participant read the Q-sample cards, categorizing them by subjective opinion.

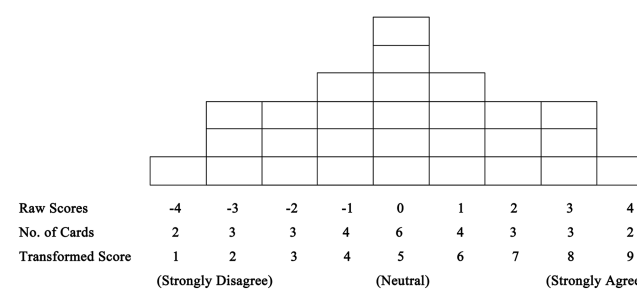


**Figure 1.** A typical Q-sort table for rank ordering Q-sample.

First, the participants were requested to read and divide the cards into 3 groups: "Agee," "Neutral," and "Disagree." Next, they were requested to differentiate the statements within the "Agree" groups according to their degree of agreement and then place them to the right of the table in order. Then, they were requested to do the same process with the "Disagree" groups and place them to the left of the table in order. The neutral cards were placed in the middle of the table. Last, the participants were asked for their reasons for these categorizations.

### Step 5: Factor Analysis and Labeling

The Q-sorting data obtained from the P-sample were entered into the PQ Method program (Version 2.35, The University of the Federal Armed Forces, Munich, Germany), followed by Q-factor and varimax rotation of the principal components analysis.[29] The factor analysis statistically identifies unknown characteristics through statistical analysis of mutual relations between variables, to discover items of high intercorrelation and assign them meaning.[26] In our case, 4 factors were found possessing the most explanatory power to effectively explain the uncertainty of patients with DFU regarding their prognosis. The factors were then named to best reflect their characteristics. The results were interpreted based on the item "statements" with stronger agreement or disagreement statements. Statements during the Q-sorting process, related literature, and general characteristics data were also utilized to name the factors.

## RESULTS

Ten participants enrolled in step 1 had a mean age 65.21 ± 7.52 years. Of these, 5 were inpatients and 5 were outpatients. The sample in step 3 was 40 patients with DFUs comprised of 16 inpatients and 24 outpatients, mean age 59.05 ± 11.08 years.

Our analysis identified 4 factors; the explanatory power per factor was 19%, 12%, 13%, and 13%, respectively, explaining 57% of the total variance with 16, 10, 9, and 5 patients who were classified as factors, respectively (Table 1). Brown[22] stated that in Q-methodology 4 to 5 people per factor are sufficient to explain the factors, and that if a factor's eigenvalue is more than 1.0 it is statistically significant. The standard scores for each factor with regard to the Q-statement are shown in Table 2. Among the 30 statements, statements 10 and 17 showed consistent opinions in all factors. These data show that most patients with DFUs experience anxiety about the uncertain prognosis of the disease.

Considering the characteristics of each factor, the 4 Q-factors classified from the uncertainty of prognosis in patients with DFU were named.

### Q-Factor 1: Confusion From a Lack of Knowledge

Sixteen patients were included in factor 1. The Q-statements with strong agreement were 1, 2, 3, 5, and 9, while the Q-statements with strong disagreement were 4, 6, 24, 25, 26, 28, 29, and 30 (Table 2). Factor 1 describes the patient's failure to understand cause of disease or condition, and lack of understanding of the treatment process due to insufficient information given to them by health care providers. Nine of the P-sample individuals exhibiting this factor had undergone treatment for 1 month or less and were mostly unemployed. They appeared to feel uncertainty while facing the daunting nature of the unknown. Moreover, unemployed individuals often lack opportunities for social contact and access to information compared to those who are employed, and they therefore may fail to accurately perceive their conditions and diseases.

P-13 showed the highest factor loading (Table 1), which means that the sample showed characteristics that were representative of each factor. P-13 was a 77-year-old patient who had just been admitted to the hospital for a DFU. In order to explain "most agree" with items 1 and 3 (Table 2), the patient said:

> "I don't know how my feet became like this. I was behaving normally, but suddenly I felt like I had foot odor. So I looked at my feet, and they were severely wounded like this. I am anxious because I feel like there seems to be no change in my wound during treatment. I was hospitalized, and I wonder when I will be able to leave the hospital. I feel frustrated."

### Q-Factor 2: Concerns About a Negative Future

Ten patients were included in factor 2. In this factor, the Q-statements with strong agreement were 13, 24, 26, and 27, and the Q-statements that strongly disagreed were 1, 8, 12, 21, and 30 (Table 2). Factor 2 reflects the patients' fears of unexpected changes after treatment versus the difficulties they presently face. Posttreatment changes include external physical and functional changes such as the foot's shape and walking abilities, as well as changes to daily lives regarding maintaining jobs or hobbies.

The P-sample individuals exhibiting this factor were generally females. Since females tend to be more sensitive to changes in appearance and for those employed, they fear losing their jobs, raising the level of uncertainty.[30] The average age in this factor was relatively younger than the ages of those in other factors. This finding reflects the higher levels of social or economic activity, and when coupled with the diagnosis of a chronic disease, patients were burdened socially and economically as well as mentally as they worry about their ability to fulfill their roles at home and in the community.[31] Additionally, the unpredictability of treatment outcomes and how it will affect their life adds to uncertainty.

The highest factor loading was observed for P-38 (Table 1), who was a 48-year-old homemaker. The ulcer reoccurred after completely healing, and the patient was undergoing treatment for 2 months. Statements that explain why the patient chose "most agree" with items 24 and 25 (Table 2) include:

> "Both of my children are still elementary school students. I cannot go to school meetings and even the playground out of fear that my children will be teased by their friends. I am afraid of how long I will have to act like this. The DFU treatment seems endless, and I feel like I cannot predict my future."

### Q-Factor 3: Overdependence on Information

Nine patients were included in factor 3. For this factor, the Q-statements with strong agreement were 12, 13, 22, 23, and 27, while the Q-statements, which strongly disagreed, were 19, 20, 24, 26, 28, and 29 (Table 2). Factor 3 includes patients whose thoughts about their disease change in response to the people around them and their situations. For example, patients come into contact with individuals with the same disease, medical staff, family, and mass media. This P-sample tended to receive more care from the families, indicating a higher degree of social support compared to individuals in other factors. Moreover, they have more opportunity to communicate with those around them, using their caregivers and family or friends as a support structure to help overcome the uncertainty associated with their DFU.

**TABLE 1.**
**Factor Loadings and Characteristics of the Subjects**

| Subject No. (Q-Sort) | Age | Sex | Marital Status | Occupation | Religion | Treatment Duration | Caregiver During Treatment | Presence of Other Diseases | Recurrence Experience | Factor Loadings |
|---|---|---|---|---|---|---|---|---|---|---|
| Type 1 | | | | | | | | | | |
| 2 | 50 | Female | Married | Unemployed | None | 2 y | No | Yes | Yes | .6649 |
| 3 | 63 | Male | Married | Self-employed | None | 1 wk | No | Yes | Yes | .6371 |
| 4 | 61 | Male | Married | Unemployed | Christian | 2 wk | No | No | No | .7853 |
| 7 | 61 | Male | Married | Unemployed | None | 2 mo | Yes | No | No | .5840 |
| 10 | 64 | Male | Married | Unemployed | None | 6 mo | No | Yes | Yes | .5250 |
| 11 | 52 | Male | Married | Self-employed | None | 5 mo | No | Yes | No | .4792 |
| 13[a] | 77 | Male | Widowed | Unemployed | None | 2 wk | No | Yes | Yes | .8481 |
| 17 | 68 | Male | Married | Unemployed | Christian | 6 mo | No | Yes | Yes | .4801 |
| 18 | 69 | Male | Married | Unemployed | None | 1 wk | No | No | No | .7947 |
| 20 | 72 | Male | Widowed | Unemployed | Christian | 2 wk | Yes | Yes | No | .6919 |
| 23 | 65 | Male | Married | Educator | Christian | 3 mo | Yes | Yes | Yes | .7710 |
| 24 | 51 | Female | Married | Unemployed | None | 3 mo | No | No | No | .5946 |
| 25 | 46 | Male | Married | Unemployed | None | 6 mo | No | No | Yes | .1806 |
| 29 | 74 | Female | Married | Unemployed | Christian | 1 mo | Yes | No | No | .5023 |
| 36 | 62 | Male | Married | Unemployed | None | 1 mo | No | No | No | .5714 |
| 40 | 48 | Male | Unmarried | Unemployed | Other | 1 wk | No | No | No | .5757 |
| Type 2 | | | | | | | | | | |
| 6 | 45 | Female | Married | Self-employed | None | 1 y | Yes | No | Yes | .6383 |
| 15 | 42 | Male | Married | Unemployed | None | 1 mo | Yes | No | No | .5918 |
| 16 | 59 | Female | Married | Housewife | Christian | 2 mo | No | Yes | Yes | .6874 |
| 21 | 48 | Male | Married | Housewife | None | 3 mo | No | No | Yes | .3735 |
| 22 | 53 | Female | Married | Educator | None | 2 wk | No | Yes | No | .5173 |
| 26 | 55 | Male | Married | Self-employed | None | 5 mo | No | No | Yes | .4776 |
| 28 | 36 | Male | Married | Office worker | None | 3 mo | No | No | Yes | .1785 |
| 33 | 37 | Female | Married | Unemployed | None | 1 mo | No | No | Yes | .4887 |
| 37 | 57 | Female | Married | Housewife | None | 3 mo | No | Yes | Yes | .5792 |
| 38[a] | 48 | Female | Married | Housewife | None | 2 mo | No | No | Yes | .7216 |
| Type 3 | | | | | | | | | | |
| 5 | 60 | Female | Married | Housewife | None | 6 mo | No | Yes | Yes | .5274 |
| 8 | 61 | Male | Married | Unemployed | Christian | 2 wk | Yes | Yes | No | .4822 |
| 12[a] | 81 | Male | Married | Unemployed | None | 2 mo | Yes | Yes | No | .7380 |
| 14 | 67 | Male | Married | Unemployed | Christian | 6 mo | No | Yes | Yes | .7082 |
| 19 | 80 | Male | Married | Unemployed | None | 4 mo | Yes | Yes | No | .5691 |
| 27 | 52 | Male | Married | Unemployed | None | 5 mo | No | Yes | Yes | .5738 |
| 30 | 59 | Male | Married | Unemployed | None | 1 y | No | Yes | Yes | .5092 |
| 32 | 64 | Male | Married | Unemployed | None | 1 mo | No | No | Yes | .7315 |
| 39 | 74 | Male | Married | Unemployed | None | 1 mo | Yes | Yes | No | .6817 |
| Type 4 | | | | | | | | | | |
| 1 | 68 | Female | Married | Housewife | None | 2 wk | Yes | No | No | .7222 |
| 9[a] | 54 | Male | Married | Self-employed | None | 3 mo | Yes | No | No | .7994 |
| 31 | 51 | Male | Married | Self-employed | None | 6 mo | Yes | Yes | Yes | .7803 |
| 34 | 66 | Male | Married | Unemployed | None | 1 y | Yes | Yes | No | .6794 |
| 35 | 62 | Male | Married | Self-employed | None | 1 y | Yes | No | Yes | .7677 |

[a]Subjects with the highest factor loading.

**TABLE 2.**
**Item *z* Scores in the Q-Sample**

| Stimulus Items/Statements | Type 1 | Type 2 | Type 3 | Type 4 |
|---|---|---|---|---|
| 1. Since diabetes patients might need their foot amputated due to a small wound, I do not know what to do to avoid amputation. | 1.3 | −1.1 | −0.7 | −0.4 |
| 2. When I see my family struggling with high medical costs, I feel uneasy about how long they must suffer. | 1.5 | 0.3 | −0.3 | −0.6 |
| 3. I thought my treatment would end after this, but I am in despair knowing that diabetic foot ulcers may recur as long as I have diabetes. | 1.6 | −0.3 | 0.6 | −0.4 |
| 4. I told the hospital that I would maintain my condition after completing my last treatment; however, I'm at the hospital again, and I don't know what to do. | −1.1 | −0.3 | −0.9 | 0.1 |
| 5. I don't know how I got this wound in the first place, and I don't know how it worsened so quickly. | 1.0 | −0.8 | −0.3 | −0.3 |
| 6. I now have confidence that I will not face this situation again because I learned why I have this wound through the treatment process. | −1.1 | −0.7 | 1.8 | −0.9 |
| 7. I have heard from the mass media that the results of diabetic foot ulcers are disastrous and that the mortality rate from amputation is high. I don't know the status of my condition, and I am afraid. | 0.9 | 0.2 | 0.1 | 0.4 |
| 8. I have experienced difficulties from several other conditions and am ready for the diabetes treatment process. I am less worried about the treatment now. | −0.4 | −1.3 | 0.4 | −0.1 |
| 9. When I was first diagnosed with a diabetic foot ulcer, I hoped to be cured; however, as the treatment period becomes longer, I am losing confidence. | 1.1 | 0.4 | −0.4 | 0.5 |
| 10. It is difficult for me to understand the status of my foot condition because I don't know what microorganisms are affecting it, but I did hear that my wound is being affected by microorganisms. | 0.5 | 0.1 | 0.2 | 0.1 |
| 11. Different medical staff personnel I dealt with spoke of my condition differently and used difficult vocabulary, so I could not understand what they meant and don't know if I am doing better or worse. | 0.2 | −0.2 | −0.9 | −0.1 |
| 12. I have past experience with diabetic foot ulcer treatment and saw others around me go through this treatment; therefore, I know how the treatment will proceed and am less worried. | −0.4 | −1.3 | 0.7 | 1.2 |
| 13. I have the experience of being fully cured by being treated by this doctor and have faith that I will be cured again. | −0.2 | 1.4 | 1.0 | 2.2 |
| 14. I feel frustrated that despite a change in treatment methods, my wound is not getting better. I don't know if the treatment I am receiving is effective. | 0.9 | 0.1 | −0.2 | 0.4 |
| 15. As I see the size of my wound increasing and the size of my foot decreasing, I feel uneasy about whether my treatment is appropriate. | 0.2 | −0.6 | −0.6 | −0.8 |
| 16. I have fewer concerns because the doctors and nurses have provided me with easy and simple explanations about my condition. | 0.3 | −0.1 | 1.4 | 0.4 |
| 17. After hearing that the patient beside me underwent lengthy treatment but still had to have their foot amputated, I have difficulties sleeping at night. | 1.0 | 1.0 | 0.6 | 0.5 |
| 18. The examination results and explanations are too often subject to change and are different from what I think. I cannot reasonably predict how I am doing. | 0.9 | 0.4 | −0.3 | 0.2 |
| 19. My doctor said that they would be using antibiotics for treatment. I experienced side effects such as nausea after the injections, and I do not know what to do. | 0.1 | −0.5 | −0.3 | −1.1 |
| 20. I feel angry that after visiting the hospital to treat my foot, I was diagnosed with more conditions after being hospitalized. | 0.1 | −0.8 | −0.3 | −1.1 |
| 21. The department of internal medicine told me to exercise because of my diabetes, and orthopedic surgery told me not to exercise because of my foot. I don't know what to do. | 0.2 | −1.0 | −0.4 | 0.6 |
| 22. In my ward are other patients who have been treated multiple times for diabetic foot ulcers and some who have been undergoing lengthy treatment, so I am able to share information with them and am less worried. | −0.0 | 0.9 | 1.5 | 1.6 |
| 23. There are multiple patients with the same wound who go through different treatment periods and experience different results, so I feel confused and keep wondering how to get good results. | 0.6 | 0.9 | 1.3 | 1.6 |
| 24. I contracted a diabetic foot ulcer, so my foot has a weird shape, and my walk looks abnormal; I do not want to meet people and am concerned about how long I will have to live like this. | −1.1 | 2.3 | −0.8 | −2.0 |
| 25. I can't work because of diabetic foot ulcer treatment so I have daily life difficulties and am frustrated because I can't take care of myself and don't know when I will be able to. | −1.5 | 0.5 | −1.8 | 1.0 |
| 26. I believe that there will be work and social limitations after my treatment, so I feel concerned and isolated. | −1.7 | 2.0 | −1.5 | −1.4 |
| 27. I was told that I have to take care of my foot on a daily basis after treatment; I am afraid to leave the hospital because I think I will be too busy with household chores and work to adequately treat myself. | −0.5 | 1.0 | −1.6 | 1.2 |
| 28. I do not know how long I will be hospitalized or the ultimate shape of my foot, so I cannot plan my future. I have no hope or purpose for my life. | −1.3 | 0.4 | −1.4 | −1.5 |
| 29. I have been well educated during this treatment and experienced much; I have confidence that it will never recur. | −1.2 | −0.7 | 1.5 | −1.1 |
| 30. I know when my foot wound will be cured and feel that I will be better soon; therefore, I am not worried. | −1.8 | −2.2 | 1.4 | −0.4 |

The highest factor loading was shown for P-12 (Table 1), an 81-year-old patient who had experienced other complications was being cared for by the spouse, but that patient had been admitted for the first time to this hospital for DFU. At the time of the interview, the patient had been receiving treatment for 2 months, and explained the reason for selecting "most agree" with items 13 and 23 (Table 2), by saying:

> "As the length of the hospital stay grows longer, I feel uneasy when I see someone having an amputation. However, I also feel like my feet are suddenly getting better when I see most of the patients recovering and leaving the hospital. I do not know what will happen to me, though."

### Q-Factor 4: Expectations for a Positive Outlook About Favorable Results

Five patients were included in factor 4. In this factor, the Q-statements with strong agreement were 6, 16, 22, 23, 29, and 30, and the Q-statements with strong disagreement were 25, 26, 27, and 28 (Table 2). Expectations for a positive outlook about favorable results involve individuals who strived to look at the positive aspects of life as well as their illness. They often exhibit gratitude for their families, their surroundings, and the medical staff who provide treatment. Moreover, rather than seeking fault in themselves and regretting their past lives during treatment, they focus on what they have learned from the treatment and make an effort to avoid the same issues going forward. This P-sample had experience with multiple chronic conditions including their diabetes and displayed the will to positively overcome uncertainty related to their DFU, based on their past experiences.

The highest factor loading was observed for P-9 (Table 1). One patient chose "most agree" to items 6 and 29 (Table 2) by saying:

> "While I was hospitalized, 3 patients and I got really close to each other. We asked each other how the treatment was going, how foot care was done at home, and learned about good foods for controlling diabetes. I lost my toes, but I think there were a lot of things I got from the people who comforted me. I have had several diabetic complications, particularly when I first started dialysis, I faced many. But I am coping well positively. So I also believe this ulcer will be cured."

## DISCUSSION

In this study we used Q-methodology to comprehensively explain the formation of 4 uncertainty factors in patients with DFU and to better guide treatment that focuses on the patient-level factors. These factors help explain why patients may delay treatment, experience prolonged treatment, and may have adherence-related, nonhealing DFUs.

The DFU management guidelines recommend that patients receive treatment as soon as possible after an ulcer develops, if possible within 24 hours.[32,33] Unfortunately, studies have shown that only 4.4% of patients with DFU pursue treatment within this time frame.[34] Delayed treatment increases the incidence of amputation.[34] According to a study by Yan and colleagues,[34] 60.4% of hospitalized patients with DFU were unaware of the signs of wound deterioration. In a study by Aliasgharpour and Nayeri,[35] hospitalized patients with DFU reported that they did not receive proper education about their disease. These findings are consistent with the viewpoint of patients in factor 1 who reported that they had no understanding of the disease and that they were not well aware of how to prevent the disease and seek appropriate treatment, despite being hospitalized and treated for a DFU. In this same study, there was a lack of awareness of the importance of proper nutrition and maintenance of normal glucose levels, both important for DFU management.[35] These findings support the need to include better patient education, a conclusion that supports factor 1 characteristics. This group's uncertainty stems from a lack understanding of the disease management and perhaps poor communication with health care providers; thus, intervention methods should target ongoing patient education on self-management of diabetes and prevention of DFU. Enhanced communication among providers, patients, caregivers, and family members is needed to resolve frustration and to improve disease management.[36]

Psychosocial sequelae have been observed in patients with ulcers, as noted by Pedras and colleagues,[3] who reported that anxiety was higher than depression in hospitalized patients with DFUs.[3] They found patients were pessimistic about their future health, including physical condition, and were worried about how their lifestyles would be impacted. Previous studies have shown that patients with DFU have a low quality of life owing to being disabled and experiencing changes in their body image.[37]

These findings support the uncertainty arising from unpredictable posttreatment changes in daily life as reported in factor 2. Patients exhibiting this factor may experience a decrease in social functioning that leads to the severing of social relationships; therefore, these patients require nursing intervention to strengthen their resolve to overcome these social obstacles. For example, a discussion about realistic social expectations, including explanations of cases in which patients fully recovered, education about how to supplement their appearance, and having lay leaders or persons with previous DFUs become involved in the care plan.[38,39]

Factor 3 included patients who experienced prognostic uncertainty because they depended on the information from and observations of others in their environment, such as other patients' treatment progress or social media. This indicates that social support can reduce uncertainty for patients, which is well-documented in studies of patients with cancer or those undergoing dialysis in which social support influenced quality of life positively.[40,41]

While patients in this factor could be influenced by social and other environmental exposures, many often overcome crises through communicating with others around them. We found in their interviews that express seeking "consolation" by thinking of individuals who face more difficult situations than they do; they also seek existential meaning by thinking of those who are dedicated to caring for and loving them. Nursing interventions could include recommendations for attendance or referrals to self-help groups, group meetings, and strengthening their support bases.[42] Nurses can help to share information about successful treatment experiences, such as dressing methods and how to use diet and exercise to control glucose.

In factor 4, patients with DFUs reinterpreted the uncertainty of their disease positively, with an expectation for favorable outcomes of treatment. This is echoed in Mishel's theory that uncertainty is regarded primarily as opportunity and that individuals can evaluate situations as having a positive impact through personal assumptions.[10,13-17] Individuals with this factor also exhibited a strong sense of belief that they would successfully overcome the present crisis viewed through the lens of their past

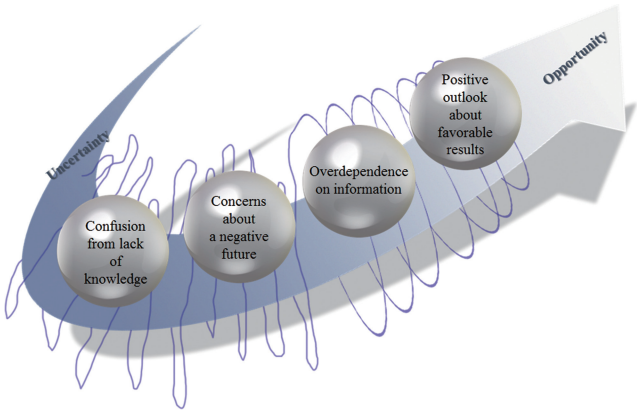


**Figure 2.** Uncertainty on the prognosis in diabetic foot ulcer patients.

experiences. In previous studies, patients with DFUs who exhibited good mental health were successful in coping with stress, which supports factor 4.[43-45] Intervention methods should focus on identifying and strengthening positive coping mechanisms that may include the presence of family, interactions with health care providers, or others. The treatment process is often lengthy; thus, awareness of psychosocial factors that may evolve such as anxiety is an important nursing consideration.[46]

The results of the present study confirmed that prognostic uncertainty in patients with DFU can be classified into different types according to the patients' subjective judgments or "viewpoints." Awareness of patients' lack of knowledge about their disease processes, their worry about negative changes in their physical, social, and financial circumstances, and confusion owing to their dependence on others for treatment influences the self-confidence (Figure 2). Uncertainly assessment should be incorporated as baseline data for clinical care decision-making. Further the results of our study can help to improve our understanding of the uncertainty of illness for patients with DFUs, guide patient education, and be used to develop more useful tools for clinical practice to assess the experience of prognostic uncertainty. In addition, by effectively identifying the type of uncertainty experienced by patients, nursing interventions can be customized that are best suited for each type of prognostic uncertainty. We believe, in the long term, effectively managing uncertainty through patient-centered nursing will produce positive effects on treatment outcomes such as improved quality of life and reduce psychosocial distress.

### Limitations and Strengths

The Q-methodology research involves small samples, and our study was conducted at a single hospital in a large metropolitan area; there is limited generalizability of study findings to different populations with chronic conditions and health care settings. However, the findings provide meaningful data that contribute to a better understanding of patients' perceptions of the uncertainty of their prognosis when living with a DFU. We believe our data can serve as the basis for larger-scale studies to further explore the concept of uncertainty and relationships among other health outcomes.

## CONCLUSION

We found 4 subjective structures of prognosis uncertainty in patients with DFU. The results of this study are expected to be used to identify the uncertainty factors of patients with DFU and to develop measurement tools or nursing intervention programs that could then be implemented.

## REFERENCES

1. Calle-Pascual AL, Redondo MJ, Ballesteros M, et al. Nontraumatic lower extremity amputations in diabetic and non-diabetic subjects in Madrid, Spain. *Diabetes Metab*. 1997;23(6):519-523.
2. Livingstone W, van de Mortel TF, Taylor B. A path of perpetual resilience: exploring the experience of a diabetes-related amputation through grounded theory. *Contemp Nurse*. 2011;39(1):20-30.
3. Pedras S, Carvalho R, Pereira MG. Predictors of quality of life in patients with diabetic foot ulcer: the role of anxiety, depression, and functionality. *J Health Psychol*. 2018;23(11):1488-1498.
4. Solowiej K, Mason V, Upton D. Psychological stress and pain in wound care, part 3: management. *J Wound Care*. 2010;19(4):153.
5. Goodridge D, Trepman E, Embil JM. Health-related quality of life in diabetic patients with foot ulcers: literature review. *J Wound Ostomy Continence Nurs*. 2005;32(6):368-377.
6. Dubský M, Jirkovská A, Bem R, et al. Risk factors for recurrence of diabetic foot ulcers: prospective follow up analysis in the Eurodiale subgroup. *Int Wound J*. 2013;10(5):555-561.
7. Waaijman R, de Haart M, Arts ML, et al. Risk factors for plantar foot ulcer recurrence in neuropathic diabetic patients. *Diabetes Care*. 2014;37(6):1697-1705.
8. Siegel TJ. Wound care in diabetic patients. *J Wound Ostomy Continence Nurs*. 2010;37(6):600-601. doi:10.1097/WON.0b013e3181f9085b.
9. Han S-K. *Innovations and Advances in Wound Healing*. Berlin, Germany: Springer; 2015.
10. Mishel MH. Uncertainty in chronic illness. *Annu Rev Nurs Res*. 1999;17(1):269-294.
11. Riemenschneider K. Uncertainty and adaptation among adults living with incontinent ostomies. *J Wound Ostomy Continence Nurs*. 2015;42(4):361-367. doi:10.1097/won.0000000000000132.
12. Parker PA, Alba F, Fellman B, et al. Illness uncertainty and quality of life of patients with small renal tumors undergoing watchful waiting: a 2-year prospective study. *Eur Urol*. 2013;63(6):1122-1127.
13. Mishel MH. Perceived uncertainty and stress in illness. *Res Nurs Health*. 1984;7(3):163-171.
14. Mishel MH. Uncertainty in illness. *J Nurs Scholarsh*. 1988;20(4):225-232.
15. Mishel MH. Reconceptualization of the uncertainty in illness theory. *J Nurs Scholarsh*. 1990;22(4):256-262.
16. Mishel MH, Padilla G, Grant M, Sorenson DS. Uncertainty in illness theory: a replication of the mediating effects of mastery and coping. *Nurs Res*. 1991;40(4):236-240.
17. Mishel MH. The measurement of uncertainty in illness. *Nurs Rese*. 1981;30(5):258-263.
18. Jang HS, Lee CS, Yang YH. Influence of uncertainty and uncertainty appraisal on self-management in hemodialysis patients. *J Korean Acad Nurs*. 2015;45(2):271-279.
19. Kim Y-J, Choi H-J.The influence of uncertainty and social support on general well-being among hemodialysis patients. *Korean J Rehabil Nurs*. 2012;15(1):20-29.
20. Sammarco A. Perceived social support, uncertainty, and quality of life of younger breast cancer survivors. *Cancer Nurs*. 2001;24(3):212-219.
21. Akhtar-Danesh N, Baumann A, Cordingley L. Q-methodology in nursing research: a promising method for the study of subjectivity. *Western J Nurs Res*. 2008;30(6):759-773.
22. Brown SR. *Political Subjectivity: Applications of Q Methodology in Political Science*. New Haven, CT: Yale University Press; 1980.
23. Chinnis AS, Summers DE, Doerr C, Paulson DJ, Davis SM. Q methodology: a new way of assessing employee satisfaction. *J Nurs Admin*. 2001;31(5):252-259.
24. Cordingley L, Webb C, Hillier V. Q methodology. *Nurse Res*. 1997;4(3):31-45. doi:10.7748/nr.4.3.31.s4.
25. Dziopa F, Ahern K. A systematic literature review of the applications of Q-technique and its methodology. *Methodology (Gott)*. 2011;7(2):39.
26. Kim H-K. *Q methodology: Philosophy, Theories, Analysis, and Application*. Seoul, South Korea: Communication Books; 2008.
27. McKeown B, Thomas DB. *Q Methodology*. London, England: Sage publications; 2013.
28. Simons J. An introduction to Q methodology. *Nurse Res*. 2013;20(3):28-32.

29. Stricklin M. *PCQ Factor Analysis Programs for Q Technique*. Lincoln, NE: University of Nebraska; 1990.
30. Krigel S, Myers J, Befort C, Krebill H, Klemp J. "Cancer changes everything!" exploring the lived experiences of women with metastatic breast cancer. *Int J Palliat Nurs*. 2014;20(7):334-342. doi:10.12968/ijpn.2014.20.7.334.
31. Hutchings S, Rushton L. Estimating the burden of occupational cancer: assessing bias and uncertainty. *Occup Environ Med*. 2017;74(8):604-611. doi:10.1136/oemed-2016-103810.
32. Chin Y-F, Yeh J-T, Yu H-Y, Weng L-C. Knowledge of the warning signs of foot ulcer deterioration among patients with diabetes [published online ahead of print December 7, 2017]. *J Nurs Res*. doi:10.1097/JNR.0000000000000258.
33. Schaper N, Van Netten J, Apelqvist J, Lipsky B, Bakker K; International Working Group on the Diabetic Foot (IWGDF). Prevention and management of foot problems in diabetes: a summary guidance for daily practice 2015, based on the IWGDF guidance documents. *Diabetes Res Clin Pract*. 2017;124:84-92.
34. Yan J, Liu Y, Zhou B, Sun M. Pre-hospital delay in patients with diabetic foot problems: influencing factors and subsequent quality of care. *Diabet Med*. 2014;31(5):624-629.
35. Aliasgharpour M, Nayeri ND.The care process of diabetic foot ulcer patients: a qualitative study in Iran. *J Diabetes Metab Disord*. 2012;11(1):27.
36. Hoth KF, Wamboldt FS, Ford DW, et al. The social environment and illness uncertainty in chronic obstructive pulmonary disease. *Int J Behav Med*. 2015;22(2):223-232. doi:10.1007/s12529-014-9423-5.
37. Edwards L. Practical advice for the effective application of compression bandaging. *J Community Nurs*. 2003;17(5):14-20.
38. Foster G, Taylor SJ, Eldridge SE, Ramsay J, Griffiths CJ. Self-management education programmes by lay leaders for people with chronic conditions. *Cochrane Database Syst Rev*. 2007;4:Cd005108. doi:10.1002/14651858.CD005108.pub2.
39. Farrell K, Wicks MN, Martin JC. Chronic disease self-management improved with enhanced self-efficacy. *Clin Nurs Res*. 2004;13(4):289-308. doi:10.1177/1054773804267878.
40. Hagen KB, Aas T, Lode K, et al. Illness uncertainty in breast cancer patients: validation of the 5-item short form of the Mishel Uncertainty in Illness Scale. *Eur J Oncol Nurs*. 2015;19(2):113-119. doi:10.1016/j.ejon.2014.10.009.
41. Sahaf R, Sadat Ilali E, Peyrovi H, Akbari Kamrani AA, Spahbodi F. Uncertainty, the overbearing lived experience of the elderly people undergoing hemodialysis: a qualitative study. *Int J Community Based Nurs Midwifery*. 2017;5(1):13-21.
42. Stegert-Oelke A. Psychological management of breast cancer patients in a therapy group. II. Practical experience. *Z Lymphol*. 1993;17(2):58-60.
43. Meijer JW, Trip J, Jaegers SM, et al. Quality of life in patients with diabetic foot ulcers. *Disabil Rehab*. 2001;23(8):336-340.
44. Siersma V, Thorsen H, Holstein PE, et al. Importance of factors determining the low health-related quality of life in people presenting with a diabetic foot ulcer: the Eurodiale study. *Diabet Med*. 2013;30(11):1382-1387.
45. Fejfarová V, Jirkovská A, Dragomirecká E, et al. Does the diabetic foot have a significant impact on selected psychological or social characteristics of patients with diabetes mellitus? *J Diabet Res*. 2014;2014:371938.
46. Germino BB, Mishel MH, Crandell J, et al. Outcomes of an uncertainty management intervention in younger African American and Caucasian breast cancer survivors. *Oncol Nurs Forum*. 2013;40(1):82-92. doi:10.1188/13.onf.82-92.


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