

# Implementation of Diabetic Foot Ulcer Prevention Program in the Provincial Hospital, Pontianak, West Borneo, Indonesia

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## ABSTRACT

DFU is a popular foot disorder that increases from year by year. DFU affects quality of life, and it increases morbidity and mortality, also incurs a substantial economic burden for society, patients and their families. The aim of this study to implement the evidence based practice of DFU prevention program in DM patients in Pontianak, West Borneo, Indonesia. This study used Stetler Model of Research Utilization to Facilitate EBP. DFU prevention program is the package consist of tools for data collection and tools for outcome evaluation. The researcher used Nursing competency questionnaire for evaluating the competency of nurses in DFU prevention program in DM patients. The questionnaire consists of 20 statements that related to the step of DFU prevention. Results/Findings: The researcher recruited 19 articles related DFU prevention from literature review. DFU prevention program consists of risk assessment, risk stratification or categorize and foot care based on risk category. Out of 40 nurses who implemented DFU prevention program, there are 20 nurses (50%) having a good competency, 14 (35%) having a satisfactory competency, and 6 (15%) having poor competency. This study found that mostly of nurses has a good competency in implementing the DFU prevention program. In other hand, there are still the nurses who has not reached a satisfactory.

**Keywords:** Diabetes mellitus, Diabetic foot, Foot ulcer, Prevention.

## I. BACKGROUND

Diabetic foot ulcer (DFU) is a common complication of diabetes mellitus (DM) that increases from year by year Aalaa et al. [1]. DFU affects quality of life, and it increases morbidity and mortality, also incurs a substantial economic burden for society, patients and their families (Khalil et al. [3]). DFU increases from year by year (Aalaa et al. [1]). There were 15% of DM patients who had DFU during their lifetime (Yazdanpanah, Nasiri and Adarvishi [4]). The prevalence of DFU in Indonesia is approximately 15% (Purwanti [5]) and the incidents among DM patients are 29 times (Hastuti, Soeharyo and Tony [6]).

The ideal treatment of DFU prevention includes regular foot inspection, risk foot assessment, transfers knowledge related risk for DFU and early detect risk of DFU, appropriate DFU intervention.

The DM patients suffering from DFU need a long treatment period for wound healing process and it would expend the wound cost. The patients need to

spend approximately 15 - 23 USD per visit. Additionally, the routine care is perceived lack of addressing the occurrence of DFU among DM patients. Nurses use diabetic foot risk category at DM clinic, but the guidelines for DFU prevention was not available. This study aimed to develop the guidelines for DFU prevention in DM patients. The guidelines for DFU prevention is very important because it would help nurses to early detect DFU in DM patients and it would save cost for DM patients if DFU can be prevented.

## II. METHODS

This study design was based on the conceptualization of the Stetler mode [7] of research utilization to facilitate evidence based practice. The Stetler model consists of preparation phase, validation phase, comparative evaluation/decision making phase, translation/application phase, and evaluation phase. This study was conducted in an IPD of Provincial hospital, Pontianak, West Borneo, Indonesia. Subsequently, 40 nurses were considered as target population for implemented the program. The inclusion criteria were as follows: 1) being registered nurse,

2) having working experience in taking care of DM patients at least a year. The study instruments consist of DFU prevention program and nursing competency for DFU prevention. The DFU prevention program consists of three major parts, namely: diabetic foot risk assessment, diabetic foot risk classification, and diabetic foot care intervention. The nursing competency for DFU prevention consists of 20 statement which related to the step of DFU prevention. Nurses get score "1" if they do each of statements, and get score "0" if they do not. Total range score 10-20. If score is more than 75% (15 - 20), it will be regarded as good, if score is 50-70% (10-14) it will be regarded as satisfactory and if score less than 45% (<9) it will be regarded as poor for competency for foot care.

### III. RESULTS

#### A. Demographic data of the nurses

The average age of the nurses who worked in IPD of provincial hospital was 30.4 (SD=5.5) years old and ranged from 24 to 43 years old. 85% the nurses were dominantly female. Most nurses from earned diploma degree (90%). The average years of working experience with DM patients was 6.3 (SD=2.6). Only two nurses had wound care certificate (10%).

#### B. Implementation of the DFU prevention Program

*Preparation phase.* goal of study had been determined. The goal was implementation of the theDFU prevention program. The sufficiency findings of research articles supported to reach of the goal. The articles were found in multiple sources including Cochrane, Pubmed, Cinahl, and Ovid by keywords such as diabetic foot ulcer/DFU, DFU prevention, risk assessment, diabetic risk category, and diabetic foot care.

*Validation phase.* 19 research articles had been recruited, there were four research articles excluded. Using the guideline for research critique adapted from Melnyk and Fineout-Overholt [8], the level evidence of articles had been analyzed and critiqued. Nine articles were level 1 (Amstrong, D. G., et al. [9]; Cisneros [10]; Lavery, et al. [11]; Lincoln, N. B., et al.[12]; Le Master et al. [13]; Fujiwara et al. [14]; Gerhater, M. A., et al. [15]; Bus, S.A [16]; Ulbrecht, S.J. [17]) and 10 articles were level 4 (Yusuf, S., et al. [18]; Boyko, E. J., et al.[19]; Leese, G. P., et al. [20]; Leese, G. P., et al. [21]; Parliani [22]; Nather, A., et al. [23]; Monteiro, S.M. and Riberio, M. D. [24]; Monteiro, S. M. et al. [25]; Monteiro, S.M. et al. [26]; Kishore, S., et al. [27].

*Comparative evaluation/decision making phase.* In this phase the research findings were drafted for DFU prevention program. Three nurses who expert in DM and DFU had analyzed and considered that the DFU prevention program was practical. The DFU prevention program can be seen in table 1-3.

*Translation/application phase.* All of the nurses involved in training how to apply the DFU prevention program. All nurses had ability in implementing the DFU prevention program in DM patients.

*Evaluation phase.* Nurses competency for DFU prevention program was assessed by questionnaire. The S-CVI nursing competency DFU prevention was 1.0. Then, the internal consistency of nursing competency DFU prevention was assessed using KR 20 coefficient in 20 nurses. The internal consistency is 0.80. There were 40 nurses who implemented DFU prevention program, there were 20 nurses (50%) having a good competency, 14 (35%) having a satisfactory competency, and 6 (15%) having poor competency. The nurses with poor performance were retrained until they passed and met the satisfaction level.

#### C. Discussions

Most of *the* nurses who implemented the DFU prevention program had satisfaction level of performance. Only six nurses who had not reached the satisfaction level and were trained by the nurses. Another possible explanation is that working experience in taking care of DM patients and training certificate of wound care are also factors supported the nurse's ability. In this study, the average years of working experience with DM patients was 6.3 (SD=2.6). There was 10% of nurses who had wound care certificate. In this study, six nurses who did not pass in the first training were the nurses who do not have wound care certificate and have less experience in taking care of DM patients. The study finding of Blegen, Vaughn, & Goode (2001, cited in McHugh & Lake, 2010) found that a higher proportion of nurses with  $\geq 5$  years of experience was associated with fewer errors. Similarly, Clarke, Rockett, Sloane, and Aiken (2002, cited in McHugh & Lake, 2010) found that low mean experience was associated with incidences/ errors.

### IV. CONCLUSION AND RECOMMENDATION

The DFU prevention program have been implemented. The DFU prevention program is useful and significant for nursing practice. The researcher has not evaluated the DM patients after implementation of the guidelines for DFU prevention. Therefore, further study should evaluate the result of implementation of the guidelines for DFU prevention in DM patients.

### DECLARATIONS

#### *Authors' contributions*

All authors meet at least one of the following criteria and have agreed on the final version: 1) substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content.

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### Ethics approval and consent to participate

The study protocol was approved by the KhonKaen University Ethics Committee for Human Research based on Declaration of Helsinki and the ICH Good Clinical Practice Guidelines.

### Consent for publication

Not applicable

### Competing interests

The authors declare that there is no conflict of interest that could be perceived as prejudicing the impartiality of the research reported.

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Table 1. Diabetic foot assessment

Components	Assessment
History	Duration of DM: ask the patient how long she or he has had DM History of ulceration and history of amputation: ask the patient about previous ulcer and assess the skin for signs of previous ulcer such as scars, Ask the patient about previous amputation and assess the skin for total toes and shape of foot for abnormalities
Physical examination	Neurological: Normal sensory can be indicated if the patient can feel the touching and giving pain on the feet and abnormal sensory can be indicated if the patient can not feel the touching and giving the pain on the feet Vascular (PAD/ PVD examination): Palpation dorsalispedis and posterior tibial Dermatologic: Inspection formed callus and fissures Musculoskeletal: Inspection foot deformity such as hammer toe, claw toe, hallux valgus, hallux rigidus, pesplanus, charcot, and limited joint mobility
Footwear	Assess kinds of footwear that have been used

Table 2. Diabetic risk category (Level of Evidence IV)

Risk Categories		Definition
Low risk	Group 0	Absence of neuropathy or PVD
High risk	Group 1	Presence of Neuropathy, Absence of PVD or foot deformity
	Group 2	Presence diabetic neuropathy and foot deformity, PVD, or diabetic
	Group 3	Presence of Neuropathy + deformity History of DFU amputation

Table 3. Diabetic foot care intervention

Risk Categories	Diabetic foot care intervention
Low risk (Group 0)	- Education Diabetic foot care 1. Daily feet inspection (injury, pain, color change, swelling, redness, breaks in the skin, etc.) including areas between the toes. 2. Regular washing of feet with careful drying, especially between the toes. 3. Advice on buying shoes: Shoes interior must be 1–2 cm longer than the foot. Low heels (<5 cm). Fasten shoes with lace to hold foot back in shoe, wearing socks reduces friction toes. 4. Demonstration of proper pedicure
High risk (Group 1)	- Education Diabetic foot care (Except no. 4) - Nurse demonstrate regular foot care and ask the patients to do demonstrate 1. Washing feet, cutting nails, removing callus 2. Use of creams for dry skin, tinea pedis and onychomycosis
Group 2	- Education Diabetic foot care (Except no. 4) - Nurse demonstrate regular foot care and ask the patients to do demonstrate 1. Washing feet, cutting nails, removing callus 2. Use of creams for dry skin, tinea pedis and onychomycosis - Vascular consultation as needed: a cold, pink, painful foot is an indication of severe ischaemia and requires urgent vascular intervention
Group 3	- Education Diabetic foot care (Except no. 4) - Nurse demonstrate regular foot care and ask the patients to do demonstrate 1. Washing feet, cutting nails, removing callus 2. Use of creams for dry skin, tinea pedis and onychomycosis - Dermatology consultation as needed: When traumatic wounds progress to foot ulcer, requires urgent dermatology intervention and patient education on need for rest, regular dressings, early reporting of problems.