

Supporting the Implementation of Discharge Planning For Diabetes Mellitus Patients by Increasing Nurses' Knowledge in the Hospital: an Experimental Study

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Abstract. Diabetes mellitus is the most prevalent chronic disease globally, with a steadily increasing incidence, including in Indonesia. During hospitalization, discharge planning—which aims to prepare patients before discharge—is often suboptimal, potentially leading to rehospitalization and reduced quality of care. This suboptimal implementation is influenced by multiple factors, particularly the knowledge of nurses. This study aims to enhance the implementation of discharge planning for diabetes mellitus patients by improving nurses' knowledge in hospital settings. A quantitative study with a quasi-experimental design was conducted, involving one intervention group and one control group, each comprising 45 respondents selected through purposive sampling based on predetermined criteria. Univariate analysis described the demographic characteristics and study variables, along with a normality test. Bivariate analysis using the Wilcoxon test was employed to examine the effect of the intervention. The findings revealed a significant improvement in nurses' knowledge regarding the implementation of discharge planning for diabetes mellitus patients ($p = 0.001$). Training interventions effectively enhanced nurses' understanding, which in turn is expected to motivate them to be more proactive in implementing discharge planning, recognizing its critical role in ensuring continuity of care.

Keywords: diabetes mellitus, discharge planning, knowledge of nurses

1 Introduction

Diabetes mellitus (DM) is the most common chronic disease globally, affecting approximately 537 million individuals, or one in every eleven people ^(1,2). According to the International Diabetes Federation, the global prevalence of DM increased from 425 million in 2017 to over 400 million, with 1.5 million deaths annually, predominantly in lower-middle-income countries ⁽³⁾. In South Asia, the prevalence among adults was estimated to reach 33 million by 2021 ⁽⁴⁾. Indonesia ranks sixth worldwide, with 10.3 million reported cases ⁽⁵⁾. DM is characterized by persistently elevated blood

glucose levels⁽⁶⁾ , with major risk factors including hereditary predisposition (58%) and high consumption of sweet foods and beverages (90%)⁽⁷⁾. Diets rich in coconut milk-based dishes and frequent consumption of high-fat animal products, particularly at night, can increase the risk of metabolic syndrome⁽⁸⁾. Without proper management, DM may lead to complications such as diabetic foot ulcers, which significantly reduce patients' quality of life and increase healthcare utilization compared to DM patients without foot ulcers⁽⁹⁾.

Discharge planning is a critical component of nursing care, aimed at ensuring continuity of care and optimal well-being before and after hospital discharge^(10, 11). It involves a multidisciplinary team—comprising physicians, dietitians, physiotherapists, pharmacists, and nurses—with nurses playing a central role as educators, collaborators, and coordinators due to their continuous interaction with patients and families^(12–15). Effective discharge planning can shorten hospital stays, optimize health outcomes, reduce patient and family dependency, lower morbidity and mortality rates, and improve patient satisfaction^(16, 17). Conversely, ineffective discharge planning can jeopardize patient health, increase the risk of relapse, and contribute to readmissions⁽¹⁸⁾.

Globally, challenges in discharge planning implementation persist. In Australia, 23% of nurses reportedly do not perform discharge planning⁽²⁰⁾, while in Southwest England the figure is 34%⁽²¹⁾. In the United States, 38 hospitals were identified as suboptimal in its implementation, leading to patient readmissions⁽²²⁾. In Indonesia, similar trends are observed, with noncompliance rates of 61% in Yogyakarta, 54% in Bandung, and 50.3% in Bukittinggi^(19, 23). A study by Fitriani (2021) in Dumai City Hospital found that 72.9% of discharge planning practices were rated poor⁽²²⁾.

Suboptimal discharge planning impacts service quality, increases relapse rates, raises hospitalization costs, and can create negative perceptions of healthcare facilities^(19, 24, 25). Conversely, optimal implementation can reduce hospital stays, prevent relapse, improve health outcomes, and lower mortality and morbidity rates⁽²²⁾.

Several factors influence the success of discharge planning, including nurses' knowledge, educational background, self-motivation, and communication skills⁽²⁶⁾. Among these, knowledge is the most critical determinant^(27–29). It is shaped not only by formal education but also by professional experience, proactive information-seeking, socio-cultural context, and environmental exposure⁽¹³⁾. Training and mentorship are key strategies for enhancing nurses' knowledge and skills^(30–33), while also reinforcing their role as educators and improving the quality of discharge planning services.

2 Methods

A quasi-experimental study was conducted involving nurses from three hospitals, selected using purposive sampling. The research included two groups, each consisting of 45 respondents, employing a one-group pre–posttest design with a control group. The intervention group received the planned program, while the control group did not receive any intervention. The design allowed for assessing changes in nurses' knowledge by comparing pretest and posttest scores within the intervention group, without implementing the intervention in the control group. The intervention consisted of a comprehensive package that included training and mentoring activities carried out across the three participating hospitals.

3 Results and Discussion

The characteristics of respondents consisted of age, length of service, gender, education level, career level and training history. The results of data analysis of nurse characteristics in 3 hospitals are presented in the following table:

Table 1. Characteristics of Respondents Based on Age, Length of Service, Gender, Education Level, Career Level of Nurses and Training History

Characteristics of Respondents	Intervention Group				Control Group			
	Mean	Median	Standard Deviation	Min-Max	Mean	Median	Standard Deviation	Min-Max
Age	32,47	32,00	5,32	24-44	32,52	32,12	5,28	22-46
Length of Service	5,80	4,00	5,020	1-19	5,20	4,00	5,240	1-17
Characteristics of Respondents	Frequency (f)		Percentage (%)		Frequency (f)		Percentage (%)	
Gender								
Male	15		33,33		17		37,78	
Female	30		66,67		28		62,22	
Total	45		100,00		45		100,00	
Education Level								
DIII Keperawatan	17		37,78		18		40,00	
DIII Kep + S.Kep/S.Tr.Kep	8		17,78		8		17,78	
S.Kep + Ners	20		44,44		19		42,22	
Total	45		100,00		45		100,00	
Career Level of Nurses								
Pra PK	5		11,11		5		11,11	
PK I	18		40,00		19		42,22	
PK II	15		33,33		12		26,67	
PK III	7		15,56		9		20,00	
PK IV	0		0,00		0		0,00	
PK V	0		0,00		0		0,00	
Total	45		100,00		45		100,00	
Training History								
Yes	4		8,89		2		4,44	
No	41		91,11		43		95,56	
Total	45		100,00		45		100,00	

Based on Table 1, the data analysis revealed that in the intervention group (n = 45), the mean age was 32.47 years, ranging from 24 to 44 years. In the control group, the mean age was 32.52

years, with the youngest respondent aged 22 years and the oldest 46 years. Previous research indicates that most nurses are in early adulthood (26–35 years), a productive age associated with optimal performance and, theoretically, with well-developed psychological and social capabilities⁽²²⁾. According to research age can affect a person's performance, where the age between 21-30 years is a very productive age⁽³⁴⁾.

The average length of service of respondents in the intervention group was 5.80 years with the lowest length of service of 1 year and the longest 19 years, while the length of service of respondents in the control group was 5.20 years with the lowest length of service of 1 year and the longest 17 years. According to research that nurses who have worked for more than 5 years have experience working or participating in the discharge process of patients and their families and are better prepared to help compared to nurses who do not have sufficient experience to carry out patient discharge procedures⁽²⁷⁾.

Gender in the intervention group, namely male gender, was 15 people (33.33%) while women were 30 people (66.67%), while in the control group, male gender was 17 people (37.78%) while women were 28 people (62.22%). This is in line with research (Adawiah et al., 2021), the results showed that the majority of nurses were female 55 people (67.1%) compared to 27 men (32.9%)⁽³⁵⁾. According to (Suprapti (2017) that gender is one of the internal factors that can influence health behavior in providing care, which is influenced by psychology, lifestyle, acceptance, perception, and coping with illness, and communication between colleagues⁽²⁹⁾.

The highest level of education was in the intervention group, namely S.Kep + Ners as many as 20 people (44.44%), while in the control group, namely S.Kep + Ners as many as 19 people (42.22%). According to Daud William Marihot Tua & Ainun Mardhiyah (2022), in other words, the level of education has a very positive impact on the performance of a nurse because nurses are a very important resource for services in hospitals and have an important role in determining health services⁽³⁶⁾.

The highest career level of nurses in the intervention group was PK I as many as 18 people (40.00%), while in the control group, PK I was 19 people (42.22%). This is in line with research (Rahman et al., 2020) which states that nurses have PK I career levels as many as 45 out of 67 (67.20%) respondents.

History of attending training that answered no in the intervention group was 41 people (91.11%), while those who answered no in the control group were 43 people (95.56%). According to (Siregar, 2018) that training is an activity to increase knowledge and skills in the work that is usually done daily⁽³⁷⁾. Training is a systematic process to obtain and improve knowledge, skills, and change one's behavior⁽³⁸⁾.

The description of nurses' knowledge about discharge planning before the intervention is presented in the following table:

Table 2. Distribution of Nurse Knowledge Classification Before Intervention

<i>Pre-test</i>	Intervention Group				Control Group			
	<i>Mean</i>	<i>Median</i>	<i>Standard Deviation</i>	<i>Min-Max</i>	<i>Mean</i>	<i>Median</i>	<i>Standard Deviation</i>	<i>Min-Max</i>
	11,70	12,00	2,437	5-16	12,10	13,00	2,403	5-17

Based on table 2, the knowledge of 45 nurses in the intervention group about discharge planning before being given the intervention obtained an average pretest score of 11.70 with the lowest pretest score of 5 and the highest was 16, while the knowledge of 45 nurses in the control group about discharge planning obtained an average pretest score of 12.10 with the lowest pretest score of 5 and the highest was 17.

This is in line with research (Mustikaningsih et al., 2020), because there has been no special training related to discharge planning, so that the implementation of discharge planning is not optimal⁽³⁹⁾. According to (Siregar, 2018) training is specific and has direct benefits for practitioners in the workplace, while general education has indirect benefits as advice that increases insights, ideas, and theoretical knowledge. In essence, training to improve psychomotor (behavior), cognitive (knowledge), and affective (attitude) abilities⁽³⁷⁾.

Knowledge is all information obtained habitually about something that can be remembered by a person or group about what is known. Nurses' knowledge is obtained through formal education. Knowledge related to general discharge planning must be known in the form of understanding, objectives, benefits, principles, risk factors and discharge planning procedures, besides that nurses need knowledge about discharge planning to assess each patient by collecting and using relevant data to find actual and potential problems, setting goals with patients and families, providing specific actions to assess and teach individually to maintain or restore the patient's condition and evaluate the continuity of nursing care⁽⁴⁰⁾. According to (Sumah & Nendissa, 2019) that the level of knowledge can affect how nurses do their work⁽²⁷⁾. Factors such as education obtained, efforts to seek information, age, work experience, socio-culture, and environment can influence knowledge⁽²⁹⁾.

The description of nurses' knowledge about discharge planning after being given the intervention is presented in the following table:

Table 3. Distribution of Nurses' Knowledge Classification After the Intervention

<i>Post-test</i>	Intervention Group				Control Group			
	<i>Mean</i>	<i>Median</i>	<i>Standard Deviation</i>	<i>Min-Max</i>	<i>Mean</i>	<i>Median</i>	<i>Standard Deviation</i>	<i>Min-Max</i>
	17,20	17,00	2,441	11-20	12,40	13,00	2,704	5-17

Based on table 3, the knowledge of 45 nurses in the intervention group about discharge planning before being given the intervention obtained an average pretest value of 17.20 with the lowest pretest value of 11 and the highest of 20, while the knowledge of 45 nurses in the control group about discharge planning obtained an average pretest value of 12.40 with the lowest pretest value of 5 and the highest of 17.

This is in line with Rahayu, C. D., Hartiti, T., & Rofi, M. (2016) which says that respondents after being given a discharge planning intervention have increased knowledge⁽³²⁾. According to research (Hariyati, 2013) states that there is a tendency that nurses' knowledge increases with the level of education and training. The results of his research show that nurses who have education and training have better knowledge⁽⁴¹⁾.

Knowledge or cognitive domain is a very important domain in shaping an action⁽⁴²⁾. According to (Sumah & Nendissa, 2019) that the level of knowledge can affect how nurses do their work⁽²⁷⁾.

Knowledge is information that a person has about something that can be remembered and learned. Nurses must understand the definition, purpose, benefits, principles, and procedures of discharge planning⁽³²⁾. Factors such as education obtained, efforts to seek information, age, work experience, socio-culture, and environment can affect knowledge⁽²⁸⁾. Nursing knowledge can be used to teach patients and families how to maintain their health conditions, restore them optimally, and assess patients' continuity of care when they return home⁽¹³⁾.

The Shapiro–Wilk normality test indicated that the pretest data were normally distributed ($\alpha = 0.305 > 0.05$), while the posttest data were not normally distributed ($\alpha = 0.017 < 0.05$). Therefore, the Wilcoxon test was used to analyze differences between pretest and posttest scores on nurses' knowledge of discharge planning in both the intervention and control groups, as presented in the following table :

Table 4. Differences in Nurses' Knowledge Before and After Intervention

Group	Variable	Mean	Median	Min-Max	Standard Deviation	p-value
Intervention	Pre-test	11,70	12,00	5-16	2,437	0,001
	Post-test	17,20	17,00	11-20	2,441	
Control	Pre-test	12,10	13,00	5-17	2,403	0,224
	Post-test	12,40	13,00	5-17	2,704	

Based on Table 4, the Wilcoxon test results showed a significant value in the intervention group ($p = 0.001$) and a non-significant value in the control group ($p = 0.224$). These findings indicate that the training provided to the intervention group had a positive effect on nurses' knowledge of discharge planning. Since the p-value was less than α ($0.001 < 0.05$), the hypothesis was accepted, confirming that the intervention significantly improved nurses' understanding of discharge planning in hospitals. This aligns with the findings of Nuramelia Datuela et al. (2022), who reported a similar effect ($p = 0.001 < 0.05$)⁽⁴³⁾, and Suprpti (2017), who demonstrated that structured discharge planning was effective ($p = 0.001$)⁽²⁹⁾.

The present study also revealed that most respondents' knowledge increased after training. This is consistent with Juliana (2020), who stated that higher nurse knowledge leads to better implementation of prepared care plans, including discharge planning⁽⁴⁴⁾. Similarly, Suparti and Ramdani (2021) found that discharge planning training enhances nurses' competence in providing hospital-based nursing care⁽⁴⁵⁾. Discharge planning can also include patient and family education, such as Diabetes Self-Management Education, which supports home-based care⁽⁴⁶⁾. Education involving family members encourages their active participation during treatment, and family-centered interventions have been shown to improve health outcomes in children and adolescents with type 1 diabetes mellitus⁽⁴⁷⁾.

Additionally, nurses may provide education on the use of natural products for glycemic control. Setiyorini's systematic review highlighted the effectiveness of complementary and alternative medicine (CAM) such as *Berberis aristata*, *Lilybum marianum*, fenugreek seed, bitter melon, cinnamon, whortleberry supplements, herbal combinations (e.g., *C. spinosa*, *R. canina*, *S. securigera*), *Nigella sativa*, mulberry juice, chicory, chamomile tea, and bell pepper juice, along with integrative approaches like yoga therapy, guided imagery, qigong, tai chi, relaxation techniques, and

acupressure. These modalities have been considered by healthcare providers as part of DM management⁽⁴⁸⁾. Given the crucial role of nurses as educators in discharge planning, continuous efforts to improve their knowledge are essential.

4 Conclusions

The training intervention effectively enhanced nurses' knowledge regarding the implementation of discharge planning for patients with diabetes mellitus. The findings of this study are expected to inform hospitals about the importance of initiatives aimed at improving nurses' knowledge of discharge planning as a means to enhance the quality of nursing services, reduce high rates of patient readmission, and serve as an evaluation tool for healthcare institutions. Furthermore, the data obtained from this research may serve as a reference for educational processes to ensure optimal discharge planning practices. In addition, this study contributes to the existing literature on nurses' knowledge of discharge planning. Future research is encouraged to further explore interventions related to discharge planning training and to examine alternative strategies that may be implemented to improve nurses' knowledge, particularly in the context of discharge planning implementation.

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