



Original Article

## Identification of Nursing Problems in Hospitalized Patients with Diabetes Mellitus

Wikan Purwihantoro Sudarmaji, Nursalam Nursalam, and Sartika Wulandari

Faculty of Nursing, Universitas Airlangga, Surabaya, East Java, Indonesia

### ABSTRACT

**Introduction:** One of the duties of nurses when managing patients with diabetes mellitus is establishing a nursing diagnosis. This study aimed to identify the nursing problems that arise in hospitalized patients with diabetes mellitus.

**Methods:** A descriptive analytical study involving 100 medical records of inpatients with diabetes mellitus from June, July and August 2019 was conducted. The data collection was done through an observation sheet according to the Indonesian Nursing Diagnosis Standards (SDKI).

**Results:** There were 30 types of nursing problems identified with the total number of nursing problems found being 332. The most frequent nursing problems were D.0142 Risiko Infeksi (Risk of Infection) 30.12%, D.0027 Ketidakstabilan Kadar Glukosa Darah (Instability of Blood Glucose Levels) 14.16%, D.0011 Risiko Penurunan Curah Jantung (Risk of Decreased Cardiac Output) 12.65%, D.0017 Risiko Perfusi Serebral Tidak Efektif (Risk of Cerebral Perfusion Not Effective) 8.73%, D.0037 and Risiko Ketidakseimbangan Elektrolit (Risk of Electrolyte Imbalance) 4.52%.

**Conclusion:** This research found there to be 30 variations of nursing problems among the hospitalized patients with diabetes mellitus with the most frequent nursing problems in the physiological category and nutrition and fluid sub-categories.

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### CONTACT

Nursalam Nursalam

✉ [nursalam@fkp.unair.ac.id](mailto:nursalam@fkp.unair.ac.id)✉ Faculty of Nursing, Universitas  
Airlangga, Surabaya, East Java,  
Indonesia

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### INTRODUCTION

Type 2 diabetes mellitus involves a complex diagnosis and requires complex care (Sutoto, 2019). Type 2 diabetes constitutes 90% of all diabetes (Kemenkes, 2014). Diabetes puts a burden on both the patient and society in the form of medical expenses, lost income, premature death and non-material burden in the form of decreased quality of life. Diabetes and its complications bring in huge economic losses for diabetic patients and their families, the health system and the national economy through direct medical costs, job loss and income (Kementerian Kesehatan RI, 2019). The American Diabetes Association stated that the total costs incurred for the handling of diabetes mellitus in 2017 was \$327 billion, which consists of \$237 billion in direct medical costs and \$90 billion due to a reduction of productivity (American Diabetes Association, 2018). Another impact of diabetes mellitus is long hospital stays.

Patients with diabetes mellitus over the age of 45 years old are admitted to hospital for an average of 8.2 days (American Diabetes Association, 2018). In patients with diabetes mellitus with complications of peripheral arterial disease (PAD), the average length of treatment is 15 + 18.2 days (Malone, 2014).

The WHO estimates that globally, 422 million adults aged over 18 years were living with diabetes in 2014 (WHO, 2016b). The largest number of people with diabetes is estimated to come from Southeast Asia and the Western Pacific, accounting for about half of the cases of diabetes in the world (Kementerian Kesehatan RI, 2019). The prevalence of diabetes mellitus in Indonesia based on the diagnosis of doctors in a population of all ages in 2018 was 1.5% of the total population of Indonesia (Kementerian Kesehatan RI, 2018). In 2030, the estimated number of people with diabetes mellitus in Indonesia is set to

be 21.3 million people (Kementerian Kesehatan RI, 2019).

The role of nurses as professionals when handling diabetes mellitus cases involves the provision of comprehensive, effective and quality nursing care. Nurses can carry out nursing interventions based on identifying the patient's response that arises due to his illness, which is expressed through nursing diagnoses. It is important to describe and identify precisely the nursing problems that arise in the patients. Identifying the patient's problems appropriately can improve the quality of the nursing assistance. However, sometimes the nurses do not describe the nursing problems present using standard terminology (Carmona, Lima, & Araujo, 2013). Nursing problems are one of the main components of nursing diagnoses and it describes the core of the client's response to his health condition or life processes (PPNI, 2017). The Indonesian Nursing Diagnosis Standards (SDKI) is a standardized terminology used for the enforcement of nursing diagnoses in Indonesia to allow it to be uniform, accurate and unambiguous to avoid inaccurate decision making and a mismatch in the nursing care provided to the clients (PPNI, 2017).

The identification of nursing problems in patients with diabetes mellitus using the terminology of the Indonesian Nursing Diagnostic Standards (SDKI) is needed to assist the nurses in identifying the nursing problems that arise in patients with diabetes mellitus. The purpose of this research is to find out the nursing problems according to the Indonesian Nursing Diagnosis Standards (SDKI) that appear in patients with type 2 diabetes mellitus.

## MATERIALS AND METHODS

This study used a descriptive analytic approach. The study was conducted at a teaching hospital in the city of Surabaya, East Java province, Indonesia. We used 100 medical records from the patients with diabetes mellitus with the following inclusion criteria: aged over 30 years, diabetes mellitus with complications, diabetes mellitus without complications and hospitalized in June, July or August 2019. The exclusion criteria were that they had either diabetes insipidus or gestational diabetes. The sampling method chosen was a random sampling technique. The researcher identified the major signs and symptoms in the medical record and then grouped them according to the criteria of the nursing problems according to the SDKI. The research instrument used was an observation sheet compiled based on the Indonesian Nursing Diagnosis Standards (SDKI) published by the Indonesian National Nurses Association (PPNI). The observation sheet contained data on their medical record number, age, sex, marital status, education level, occupation, religion, financial status, medical diagnoses, subjective major signs and symptoms, objective major signs and symptoms, risk factors and any nursing diagnoses that can be established. This study passed the ethical test

Table 1. Characteristics of the study

Characteristics	n	%
<b>Gender</b>		
Male	45	45
Female	55	55
<b>Age (years)</b>		
30 - 40	3	3
41 - 50	15	15
51 - 60	40	40
61 - 70	29	29
71 - 80	12	12
<b>Marital Status</b>		
Married	83	83
Not Married	17	17
<b>Religion</b>		
Islam	87	87
Protestant	11	11
Katolik	1	1
Budha	1	1
<b>Education Status</b>		
Elementary School	29	29
High School	52	52
Diploma 1	1	1
Diploma 3	7	7
Bachelor's	15	15
<b>Employment Status</b>		
Not Working	3	3
Took Care Of The Household	46	46
Retired	9	9
Government Employee	3	3
General Employee	24	24
Fisherman	9	9
Farmer	1	1
Driver	1	1
Entrepreneur	12	12

conducted by the Health Research Ethics Commission with ethical code number 194/KEH/2019.

## RESULTS

Using the 100 patient medical records, it was determined that 55% of the patients female. The age range was from 32 to 84 years old with an average age of 59.03. Most were married at 83%, Muslim at 97%, had a high school education or equivalent at 43% and took care of the household at 46%.

Table 2 shows the 10 most found nursing problems from a total of 30 types of nursing problem. Most diabetes mellitus patients are at risk of experiencing or contracting an infection.

Table 3 shows the categories and subcategories of the nursing problems. Most nursing problems were found to be in the physiological category (55%) with a distribution across the sub-categories of circulation (25%), nutrition and fluids (23%), activity and rest (4%), respiration (2%) and elimination (1%).

## DISCUSSION

Diabetes mellitus refers to an absolute or relative insulin deficiency and impaired insulin function. Diabetes mellitus is classified into type 1 DM, type 2 DM, other type DM and DM in pregnancy. Diabetes mellitus type 2 (DMT2) is a group of metabolic diseases characterized by hyperglycemia occurring

Table 2. The nursing problems (SDKI) that arise in patients with type 2 diabetes mellitus

Nursing Problem	n	%
Risk of Infection	100	30,12
Instability of the Blood Glucose Level	47	14,16
Risk of Decreased Cardiac Output	42	12,65
Risk of Cerebral Perfusion	29	8,73
Risk of Electrolyte Imbalance	15	4,52
Impaired Physical Mobility	12	3,61
Impaired Tissue Integrity	11	3,31
Nausea	10	3,01
Acute pain	10	3,01
Fall Risk	10	3,01

Table 3. The categories and subcategories of nursing diagnoses (SDKI) in patients with type 2 diabetes mellitus

Category	n	%	Subcategory	n	%
Physiological	184	55%	Safety and Protection	126	38%
Environmental	126	38%	Circulation	83	25%
Behavioral	1	0%	Nutrition and Fluid	78	23%
Psychological	20	6%	Pain and Comfort	20	6%
Relational	1	0%	Activity and Rest	14	4%
			Respiration	7	2%
			Elimination	2	1%
			Social interaction	1	0%
			Personal Hygiene	1	0%

due to abnormal insulin secretion, insulin action or both (Decroli, 2019). Type 2 diabetes accounts for 90% of all diabetes (Kemenkes, 2014). DMT2 is characterized by impaired insulin sensitivity and/or impaired insulin secretion. DMT2 clinically arises when the body is no longer able to produce enough insulin to compensate for the increase in resistant insulin. The signs and symptoms of diabetes mellitus are hyperglycemia accompanied by polyuria, polydipsia and polyphagia. Hyperglycemia accompanied by ketoacidosis or hyperosmolar nonketotic syndrome is the most common life-threatening complication in patients with uncontrolled diabetes mellitus.

Patients with diabetes mellitus may also suffer from high blood pressure and anomalies in lipoprotein metabolism. In the long term, the symptoms of retinopathy appear with the possibility of a loss of vision. Nephropathy can cause kidney failure. Neuropathy is associated with the appearance of lesions in the legs, amputations, and joint Charcot. Autonomic neuropathy produces signs of gastrointestinal, genitourinary, and cardiovascular disorders. Sexual dysfunction may occur in patients with diabetes mellitus. Eventually, patients with diabetes mellitus usually develop atherosclerotic cardiovascular disease, peripheral artery disease and cerebrovascular disease (Okur, Karantas, Hospital, & Sifaka, 2017). DM complications include acute complications and chronic complications (Perkeni, 2015). The crisis of hyperglycemia and hypoglycemia is an acute complication while macroangiopathy and microangiopathy are chronic complications.

Diabetic ketoacidosis (KAD) is an acute complication of diabetes that is characterized by an increase in high blood glucose levels (300-600 mg/dl) accompanied by the signs and symptoms of acidosis

and strong (+) ketone plasma. Osmolarity increases the anion gap. Hyperglycemic status hyperosmolar (SHH) is a condition where an increase in blood glucose is very high (600-1200 mg/dl), without the signs and symptoms of acidosis. Plasma osmolarity is greatly increased (330-380 mos / ml), plasma ketone (+/- ) and the anion gap is normal or slightly increased. Hypoglycemia is characterized by a decrease in blood glucose levels <70 mg/dl.

Hypoglycemia is a decrease in serum glucose concentration with or without the symptoms of the autonomic system, such as the presence of Whipple's triad. This is where there are symptoms of hypoglycemia, namely low blood glucose levels, where the symptoms can be reduced with treatment. Macroangiopathy will cause disorders of the heart arteries including coronary heart disease, and disorders of the brain blood vessels, resulting in ischemic stroke or hemorrhagic stroke. The effect on the peripheral blood vessels includes peripheral artery disease that often occurs in people with DM. The typical symptoms that usually appear first is pain during activity that is diminished at rest (claudication intermittent) but often it can also be present without symptoms. Ischemic ulceration of the foot is a disorder that can be found in diabetic patients. Microangiopathy can cause diabetic retinopathy, diabetic nephropathy and diabetic neuropathy. Good glucose and blood pressure control will reduce the risk or slow the progress of retinopathy, nephropathy and neuropathy. In peripheral neuropathy, a loss of distal sensation is an important risk factor for foot ulcers which increases the risk of amputation. Symptoms that are often felt include that the feet feel like they are burning and vibrating on their own, and there is more pain felt at night.

Diabetes is a leading cause of blindness, kidney failure, the amputation of the lower limbs and other long-term effects (WHO, 2016a). In this study, all of the patients with diabetes mellitus have a nursing-assessed risk of infection. The definition of risk of infection according to the Indonesian Nursing Diagnosis Standard is the risk of experiencing an increase in pathogenic organisms. One risk factor for nursing problems concerning the risk of infection is that it is a chronic disease (e.g. diabetes mellitus) (PPNI, 2017). Hyperglycemia and diabetes provide a higher risk of serious complications such as infection, diabetic ketoacidosis, hyperosmolar hyperglycemic states, dehydration, electrolyte balance, a greater use of antibiotics and increased hospitalization (Crawford, 2013). The condition of hyperglycemia in patients with diabetes mellitus is thought to impair neutrophil function and the response of the T lymphocytes to infection (Critchley et al., 2018).

This is consistent with the complications of the disease found in the study, namely that 7.43% had hyperglycemia. Another study states that diabetes mellitus patients are estimated to cause 6% of cases of infection associated with hospitalization and 12% of cases of infection-related deaths. They have a high susceptibility to all infections, especially bone and joint infections, sepsis and cellulitis (Dewilde, Harris, Hosking, & Cook, 2018).

Patients with diabetes mellitus are at risk of developing hypoglycemia or hyperglycemia. According to the Indonesian Nursing Diagnosis Standards, the definition of instability in blood glucose levels is the variation in blood glucose levels up / down from the normal range. In this study, the complications of hyperglycemia were found to total 7.43% while hypoglycemia totaled 3.72%. Age, being of African-American ethnicity, having had diabetes for longer, insulin therapy, therapy with oral antidiabetic agents, macroalbuminuria, inadequate physical activity, and genetic factors are the risk factors of hypoglycemia. Elderly patients have a higher risk of hypoglycemia due to factors such as the side effects of treatment, poor nutrition, cognitive impairment, kidney failure, autonomic dysfunction, and long-term DM (Teixeira & Cassia, 2017). The research sample obtained data stating that those aged 50 to 90 years old made up 82% of the sample. The complications of chronic kidney failure were found to total 4.46%, diabetic nephropathy totaled 4.09% and acute kidney injuries totaled 1.49%. The intermediate risk factors for hyperglycemia include being aged 45 years old over, having a body weight above normal, genetic heredity, doing physical activity less than 3 times a week, having gestational diabetes, giving birth to a baby more than 9 lb, and having polycystic ovary syndrome (Piccinini, 2020).

The Indonesian Nursing Diagnosis Standard defines the risk of a decrease in cardiac output as the risk of experiencing inadequate heart pumping compared to the body's metabolic needs with the risk factors for afterload changes, changes in heart frequency, changes in heart rhythm, changes in

contractility or changes in preload involved (PPNI, 2017). Cardiac output, which is the volume of blood pumped by the heart per minute, is the result of heart rate and stroke volume which is affected by preload, afterload and contractility (Ribeiro et al., 2016).

The heart rate/rhythm is controlled by the depolarization rate of the sinoatrial node which can be modified by hormones (epinephrine, thyroxine), the electrolyte concentration in the plasma, body temperature, the autonomic nervous system and atrial wall stretching. Preload is associated with ventricular filling pressure at maximum stretching and it is influenced by the end-diastolic volume of the ventricles and the Frank-Starling mechanism. Afterload refers to blood pressure or resistance at the time of ventricular ejection (Melo et al., 2011). The result obtained in this study shows that 10.41% of the sample had complications from hypertension, 3.72% had complications from acute decompensated heart failure, 1.49% had complications from hypertensive heart disease, 0.37% had complications from an acute myocardial infarction, 0, 37% had ischemic cardiomyopathy and 0.37% had complications from multiple premature atrial contractions.

The risk of cerebral perfusion is not effectively defined as a risk of decreased blood circulation to the brain (PPNI, 2017). Type 2 diabetes mellitus affects the circulation of glucose and insulin across the blood-brain barrier. This results in changes in the regional metabolism and microcirculation (Jansen et al., 2016). Increased insulin resistance is an important risk factor for decreased cerebral blood flow and the pattern of cerebral hypoperfusion in patients with type 2 diabetes mellitus is similar to the pattern in the early stages of dementia (Cui et al., 2016). The condition of hyperglycemia persisting for a long time can reduce the regional blood flow and increase membrane permeability which results in permanent damage to brain cells (Jansen et al., 2016). In line with this study, the data indicated that 7.43% of the study sample had stroke complications.

The risk of electrolyte imbalance is defined as the risk of experiencing changes in serum electrolyte levels with one of the risk factors being an interference with the regulatory mechanisms (e.g. diabetes) (PPNI, 2018). Electrolyte disturbances can occur in patients with decompensated diabetes mellitus including as a result of complex regimen therapy, being elderly and having a kidney disorder (Liamis et al., 2014). Diuretic therapy in patients with diabetes mellitus can cause hyponatremia (Woyesa, Gebisa, & Anshebo, 2019) and hypokalemia, whereas hyperkalemia can result from a shift in potassium due to hypertonicity, insulin deficiency, cell lysis (rhabdomyolysis), acidosis, drugs (e.g. beta-blockers) and excretion disorders related to kidney potassium (Woyesa et al., 2019). Other studies have suggested that abnormal potassium values are caused by insulin treatment (Woyesa et al., 2019). This study found the number of patients with hypokalemia made up 2.97%, while hyperkalemia made up 1.49% and hyponatremia made up 0.74%.

## CONCLUSION

Referring to the nursing problems among the inpatients with diabetes mellitus, the most commonly found problems following the terminology of the SDKI include the risk of infection, the instability of the patient's blood glucose levels and the risk of decreased cardiac output. Nursing problems were found to adequately describe the human response to the diabetes mellitus as indicated by the study sample. The use of standard terminology when writing up the nursing problems is necessary for uniformity, to improve accuracy and to avoid ambiguity. The limitation of this research is that the data retrieval was done retrospectively, as the researchers did not have the opportunity to validate the data on the major signs and symptoms of the nursing problems with the patients. The implication of this research is the necessity of assisting the nurses in terms of identifying the nursing problems that arise in patients with diabetes mellitus.

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