



## Effect of a designed discharge plan on incidence of complication's among patients with diabetic ketoacidosis

Abdel Rhman Soliman<sup>1</sup>, Furat Hussein Mahmoud<sup>2</sup>, Rasha Awad Abdel Magied Salime<sup>3</sup>

<sup>1</sup>B.Sc. Nursing, Faculty of Nursing, Cairo University, Egypt

<sup>2</sup>Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Helwan University, Egypt

<sup>3</sup>Assistant Professor of Critical Care Nursing, Faculty of Nursing, Helwan University, Egypt

**Corresponding author:** Abdel Rhman Soliman, **E-mail:** abdosolyman80092@yahoo.com

**DOI:** 10.48047/ecb/2023.12.5.231

**Article History:** Received: 05.03.2023

Revised: 28.04.2023

Accepted: 10.05.2023

### ABSTRACT

**Background:** Diabetic ketoacidosis (DKA) is a serious complication of relative insulin deficiency affecting primarily type-1 diabetes mellitus (DM). DKA can occur in type-2 DM when insulin levels fall far behind the body's needs. DKA is so named due to high levels of water-soluble ketone bodies (KBs), leading to an acidotic physiologic state. **Objective:** The aim of this study was to determine the effect of a designed discharge Plan on Incidence of Complication's among Patients with Diabetic Ketoacidosis. **Design:** Quasi Experimental design will be utilized in this study. **Setting:** intensive care unit – national institute of diabetes and endocrinology (NIDE). **Sample:** Purposive sample of adult patients' 40 patients diagnosed with diabetic ketoacidosis in the previous mentioned setting. **Tools:** **tool (I)** self-administered, interview questionnaire Part I: Patient's sociodemographic characteristics Part II: Patient's Medical Data. **Tool (II):** pre and post discharge knowledge assessment questionnaire. **Tool( III):** Risk for complications assessment questionnaire. **Results:** the study findings showed that (32.5%) of the studied patients were aged between 20-<30 years old, the mean SD age was  $40.27 \pm 10.36$  years. Also, three quarters (75%) of them reside at urban areas. Furthermore, less than half (45.0%) of them were not working. It clarifies that, there was a marked improvement in patients' knowledge about the risk factors and symptoms of diabetic ketoacidosis post implementation of a designed discharge plan with a highly statistically significant difference at ( $P = < 0.01$ ) between pre and post implementation of a designed discharge plan. As evidence, only (37.5%) of the studied patients have correct knowledge about definition of risk factors for diabetic ketoacidosis and symptoms of diabetic ketoacidosis at pre implementation of designed discharge plan. While changed to (95.0%) at post implementation of designed discharge plan. **Conclusion:** Discharge plan has a positive effect on incidence of complication's among patients with diabetic ketoacidosis. One fifth of the studied patients had satisfactory level of total knowledge about diabetic ketoacidosis pre implementation of designed discharge plan. While changed to the majority of them at post implementation of designed discharge plan. Additionally most of the studied patients had low level of total risk for complications of diabetic ketoacidosis. Also, more than one tenth of them had moderate level. While, minority of them had high level. **Recommendations:** Raise the patient's awareness about the most important symptoms of DKA causes, signs and symptoms, and prevention measures and the immediate action to be done for any incidence of this type of diabetes complication. Providing training programs for nurses in ICU to be followed in the routine nursing care for patients with DKA.

**Keywords:** Discharge Plan, Incidence of complication's Diabetic Ketoacidosis.

## INTRODUCTION

Diabetes mellitus (DM) is an endocrine disorder that leads to abnormal metabolism of blood glucose. It is a chronic disease that results in both short-term and long-term complications. Diabetes can lead to a number of complications such as hyperosmolar hyperglycemic state (HHS) and diabetic ketoacidosis (DKA) Due to hyperglycemic emergencies, the incidence of mortality ranges from 4% to 40% in developing countries<sup>(1)</sup>.

Diabetic ketoacidosis (DKA) is most common among patients with type 1 diabetes mellitus and develops when insulin levels are insufficient to meet the body's basic metabolic requirements. DKA is the first manifestation of type 1 diabetes in a minority of patients. Insulin deficiency can be absolute (e.g., during lapses in the administration of exogenous insulin) or relative (e.g., when usual insulin doses do not meet metabolic needs during physiologic stress)<sup>(2)</sup>.

Diabetic ketoacidosis (DKA) is a serious complication of relative insulin deficiency affecting primarily type-1 diabetes mellitus (DM). DKA can occur in type-2 DM when insulin levels fall far behind the body's needs. DKA is so named due to high levels of water-soluble ketone bodies (KBs), leading to an acidotic physiologic state<sup>(3)</sup>.

The symptoms of an episode of diabetic ketoacidosis usually evolve over a period of about 24 hours. Predominant symptoms are nausea and vomiting, pronounced thirst, excessive urine production and abdominal pain that may be severe. In severe DKA, breathing becomes rapid and of a deep, gasping character, called "Kussmaul breathing". The abdomen may be tender to the point that a serious abdominal condition may be suspected, such as acute pancreatitis, appendicitis or gastrointestinal perforation. Vomiting altered blood that resembles coffee grounds occurs in a minority of people and tends to originate from erosion of the esophagus. In severe DKA, there may be confusion or a marked decrease in alertness, including coma<sup>(4)</sup>.

Discharge planning is a key element in patient care. It involves outlining the routine and health needs that should be expected upon exit from the facility, which is a link between functioning in the community and hospitalization. Ideally, discharge planning occurs when patients are admitted for hospital<sup>(5)</sup>. Discharge planning is an interdisciplinary

approach to continuity of care; it is a process that includes identification, assessment, goal setting, planning, implementation, coordination, and evaluation and is the quality link between hospitals, community-based services, nongovernment organizations, and health care providers<sup>(6)</sup>.

**Purpose of discharge planning** based on the individual needs of the patient, effective discharge planning supports the continuity of health care between the health-care setting and the community; it is described as "the critical link between treatment received in hospital by the patient, and post-discharge care provided in the community." The purpose of discharge planning is to ensure continuity of quality care between the hospital and the community. In addition, the aim of discharge planning is to reduce hospital length of stay and unplanned readmission to hospital, as well as to improve the coordination of services following discharge from hospital<sup>(7)</sup>.

### Significance of the study:

Diabetic ketoacidosis (DKA) is an acute complication of uncontrolled diabetes mellitus that is associated with increased morbidity and mortality. Epidemiological studies have found that rates of DKA in new-onset type 1 diabetes vary between countries. While studies from Denmark, Kuwait, Canada and Germany have found the rates of DKA in newly diagnosed type 1 diabetes to be 17.9%, 24.8%, 25.6% and 35.2%, respectively, in United Arab Emirates, its rate was 80%. Saudi Arabia has one of the highest rates of DKA worldwide, with various studies showing that in newly diagnosed type 1 diabetes, these rates are 40% in the Eastern region, 55% in the Northwestern region and 67.2% in Riyadh city<sup>(8)</sup>.

Egypt is one of the 21 countries of the International Diabetes Federation of The Middle East and North Africa (MENA) Region. About 55 million people in the MENA region are diabetic and expected to be 108 million by 2045. In 2019, IDF estimated that Egypt is the 9th country worldwide with about 8,850,400 cases and a prevalence of 15.2% in adults. By 2045, Egypt expected to be the 7th country worldwide<sup>(9)</sup>.

### AIM OF THE STUDY

The Study was to determine the effect of a designed discharge plan on incidence of complication's among patients with diabetic ketoacidosis.

### Research hypotheses:

#### At the end of the study:

H1-patients who will participate in the study will have better knowledge scores than before participation.

H2- patients who will participate in the study will demonstrate decrease in occurrence of complications.

H3-there will be statistically significant positive correlation between patients knowledge and the incidence of complications post participation in the study.

## SUBJECT AND METHODS

### I-Research design:

Quasi-Experimental design will be utilized in this study.

#### Setting:

The sample was selected from intensives care unit – national institute of diabetes and endocrinology(NIDE),consists of many intensive care units at 4 floor consist of:

\*Medicine intensive care unit -capacity beds (7 beds).

\*Surgery intensive care unit –capacity beds (4 beds).

\*Isolation unit –capacity (1 beds).

\*Dialysis unit- capacity (1 beds).

#### Subject:

Purposive sample of all adult patients 40 patients diagnosed with diabetic ketoacidosis in the previous mentioned settings and met the following inclusion and exclusion criteria.

#### Inclusion criteria:

-Patient admitted to intensive care unit with diabeticketoacidosis.

#### Exclusion criteria:

-Cancer patients, renal Failure, and disturbed of conscious level Patients

#### Tools of data collection:

**Data will be collected using the following tools: 1<sup>st</sup> tool: self administered, interview questionnaire:**

This tool adapted from **Abdelhameed Mahros<sup>(10)</sup>**: impact of designed discharge plan on myocardial infraction patients outcomes. and modified by the investigator.

It is consisting of two parts:

#### **Part I: Patient's sociodemographic characteristics:**

This was consists of data related to patient's

age, gender, level of education, marital status and occupation, income.

#### **Part II: Patient's Medical Data:**

The medical information form included the information of patient's health history as, data of admission, present diagnosis and previous hospitalization etc.

**2-Second tool: pre and post discharge knowledge assessment questionnaire:** to assess patients knowledge about; definition, causes, risk factors, manifestation, treatment, activities, life style modification.

- Measure blood glucose.
- Insulin self administration.
- Filling a diet record.

This tool adapted from (**Abdelhamid Mahros<sup>(10)</sup>**): impact of designed discharge plan on myocardial infraction patients outcomes. and modified by the investigator.

#### **Third tool: Risk for complication assessment questionnaire**

To assess patients risk for complications through patients compliance to medication regiment –diet regiment –exercise and follow up appointment.

This sheet was designed to evaluate patient risk for complication through evaluate subjects adherence to the prescribed regiment

#### **Included six main area:**

- Adherence to the life –long post discharge instruction.
- Adherence to prescribed medication regiment.
- Adherence to prescribed diet regiment.
- Adherence to prescribed follow up system.
- Adherence to prescribed exercise regiment adherence to stress management techniques regiment.

This tool adapted from (**Abdelhamid Mahros<sup>(10)</sup>**): impact of designed discharge plan on myocardial infraction patients outcomes. and modified by the investigator.

#### **Scoring system:**

- Consider high risk for complication less than 70% of compliance.
- Consider moderate risk for complication (70%-80%) of compliance.
- Consider low risk for complication more than 80%.

## II- Operational items:

It includes the preparatory phase, content validity, content reliability, pilot study and field work.

### The Preparatory Phase:

This phase starts prior to the development of the tools based on the review of the current local and international- related literature and theoretical knowledge of various aspects of the study using books, articles, websites and magazines to develop tools for data collection and suggested the nurses 'guidelines.

### Content Validity and Reliability:

#### Validity of the tool:

**Validity** is the extent to which the instrument actually measures what it's designed to measure <sup>(11)</sup>. The tools were revised by a panel of five experts in medical surgical which included five assistant professors of medical surgical nursing department, faculty of nursing, Helwan University who revised the tool's content for clarity, relevance, comprehensiveness, understanding, and ease for implementation. All recommended modifications were done.

**Reliability:** concerns the faith that one can have the data obtained from the use of an instrument that is the degree to which any measuring tool controls for random error <sup>(12)</sup>. Reliability was measured by Alpha Cronbach for discharge knowledge assessment questionnaire was 0.821 Reliability of aassessment questionnaire for complications of Diabetic ketoacidosis was 0.850.

#### Pilot Study:

A pilot study for tools of data collection was carried out in order to check and ensure the clarity, applicability, relevance and feasibility of the tools. For this study, the investigator selected 4 (10%) randomly to participate in the pilot study. The patients who was included in the pilot study was excluded from the sample because minimal modifications were done after conducting pilot study.

#### Field Work:

**Field work description:** An approval was obtained from the scientific ethical committee of Faculty of Nursing-Helwan University and the study subjects individually to give a verbal agreement to participation with the study.

## III- Administrative items:

An official permission for data collection in intensive care unit – national institute of diabetes and endocrinology (NIDE) was obtained from the hospital administrative personnel by the submission of a formal letter from the Dean of the faculty of Nursing Helwan University explaining the aim of the study in order to obtain permission and help.

### Ethical Consideration:

An official permission to conduct the proposal study was obtained from the scientific research ethics committee in faculty of nursing at Helwan university, before starting the study, participation in the study is voluntary and subjects were given complete full information about the study and their role before signing the informed consent .the ethical consideration was included explaining the purpose and nature of the study stating the possibility to with draw at any time, confidentiality of the information where it was not be accessed by any others without taking permission of participation, ethics, values, culture believes were respected.

## IV- Statistical design:

The Statistical Package for Social Science (SPSS) version 28.0 was employed by the researcher to analyze the data. Mean  $\pm$  standard deviation (SD) were used to present the quantitative data, while frequencies and percentages were used to present the qualitative data. The Statistical analysis was performed through utilization of SPSS software, version 28.0 to test the associations between qualitative variables under study, and the chi-square ( $\chi^2$ ) test was utilized for this purpose. The statistical significance level was established as a p-value  $< 0.05$ . R-test was used to test the associations among the under studied variables. A Chi-square ( $X^2$ ) test of significance was employed to compare the proportions of two categorical variables. the significance level was determined using the probability (P-value) approach, If the P-value was less than 0.05, it was deemed significant (S.), If the P-value was less than 0.001, it was deemed highly significant (H.S.) and If the P-value was greater than 0.05, it was deemed not significant (N.S.).

## RESULTS

**Table (1): Frequency and percentage distribution of the studied patients according to their socio demographic characteristics (n=40).**

Items	No.	%
<b>Age (years)</b>		
20-<30	13	32.5
30-<40	10	25.0
40-<50	7	17.5
≥ 50	10	25.0
<b>Mean ± SD</b>	<b>40.27± 10.36</b>	
<b>Residence</b>		
Rural	10	25.0
Urban	30	75.0
<b>Marital status</b>		
Married	28	70.0
Unmarried	12	30.0
<b>Occupation</b>		
Worker	14	35.0
Employer	8	20.0
Non	18	45.0
<b>Smoking status</b>		
Smoker	15	37.5
Non –smoker	25	62.5
<b>Cigarettes per day (n=15)</b>		
5-<10	3	20.0
10-<20	4	26.7
≥ 20	8	53.3

**Table (1):** shows (32.5%) of the studied patients were aged between 20-<30 years old, the mean SD age was 40.27 ± 10.36 years. Also, three quarters (75%) of them reside at urban areas. Furthermore, less than half (45.0%) of them were not working. Also, more than one-third (37.5%) of the studied patients were smoker, more than half (53.3%) of them smoke ≥ 20cigarettes per day. Moreover, less than three quarters and the vast majority (72.5% and 95%) of the meat three diets per day and eat carbohydrate as a main diet, respectively. Furthermore, more than two-thirds (70.0%) of them have enough income. Also, more than two-thirds (67.5%) of them do not have a specific diet. Moreover, more than half and the majority (55.0% and 82.5%) of them don't practice any sports and drink coffee, respectively.

**Table (2): Comparison between patients' knowledge about the treatment methods and medications at pre and post implementation of a designed discharge plan (n=40).**

Items	Pre intervention				Post intervention				X <sup>2</sup>	p-value
	Correct answer		Incorrect answer		Correct answer		Incorrect answer			
	No.	%	No.	%	No.	%	No.	%		
Different ways to treat diabetic ketoacidosis	7	17.5	33	82.5	35	87.5	5	12.5	22.17	0.000**
Side effects of medications used to control diabetic ketoacidosis	5	12.5	35	87.5	34	85.0	6	15.0	26.32	0.000**
Insulin side effects	10	25.0	30	75.0	35	87.5	5	12.5	19.22	0.000**

X<sup>2</sup>: Chi Square Test. (\*\*) highly statistically significant at p<0.01.

**Table (2):** displays that, there was a marked improvement in patients' knowledge about the treatment methods and medications post implementation of a designed discharge plan with a highly statistically significant difference at (P= < 0.01) between pre and post implementation of a designed discharge plan. As evidence, (17.5%, 12.5% and 25% respectively) of the studied patients have correct knowledge about the different ways to treat diabetic ketoacidosis and side effects of medications used to control diabetic ketoacidosis and insulin side effects at pre implementation of designed discharge plan. While changed to (87.5% and 85.0%,87.5% respectively) at post implementation of designed discharge plan.



**Table (3): Comparison between total patients' knowledge about diabetic ketoacidosis at pre and post implementation of a designed discharge plan (n=40).**

Knowledge subscales	Pre intervention				Post intervention				X <sup>2</sup>	p-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No.	%	No.	%	No.	%	No.	%		
Risk factors and symptoms of diabetic ketoacidosis	8	20.0	32	80.0	36	90.0	4	10.0	32.17	0.000**
Self-reported Practices	11	27.5	29	72.5	37	92.5	3	7.5	28.14	0.000**
Treatment methods and medications	7	17.5	33	82.5	35	87.5	5	12.5	29.20	0.000**
Lifestyle modification	9	22.5	31	77.5	34	85.0	6	15.0	30.15	0.000**
<b>Total knowledge</b>	<b>8</b>	<b>20.0</b>	<b>32</b>	<b>80.0</b>	<b>35</b>	<b>87.5</b>	<b>5</b>	<b>12.5</b>	<b>36.52</b>	<b>0.000**</b>
<b>Mean SD</b>	<b>5.96 ± 2.08</b>				<b>20.04 ± 3.13</b>				<b>t=17.30</b>	<b>0.000**</b>

X<sup>2</sup>: Chi Square Test t= Paired test. (\*\*) highly Statistically significant at p <0.01

**Table (3)** shows that, there was a marked improvement in all subscales of patients' knowledge about diabetic ketoacidosis post implementation of a designed discharge plan with a highly statistically significant difference at (P= < 0.01) between pre and post implementation of a designed discharge plan. As evidence, only (20.0%-27.5%,17.5%,22.5%) of the studied patients have satisfactory level of total knowledge about diabetic ketoacidosis, risk factors and symptoms of diabetic ketoacidosis, self-report practices, treatment methods and medication, life style modification at pre implementation of designed discharge plan. While changed to (90%, 92.5%, 87.5%, 85.5%) at post implementation of designed discharge plan.

**Table (4): Frequency and percentage distribution of the studied patients according to risk for complications of diabetic ketoacidosis (n=40).**

Items	Always		Sometime		Rarely		Never	
	No.	%	No.	%	No.	%	No.	%
<b>Patients' compliance to lifelong instruction</b>								
- Check blood glucose level frequency daily	35	87.5	5	12.5	0	0.0	0	0.0
- Avoid to exposure to high physical exertion	34	85.0	6	15.0	0	0.0	0	0.0
- Avoid stimulants like sweets	<b>36</b>	<b>90.0</b>	4	10.0	0	0.0	0	0.0
- Stop smoking	35	87.5	5	12.5	0	0.0	0	0.0
- Patients' compliance to regular follow up	34	85.0	6	15.0	0	0.0	0	0.0
- Patients' compliance to medication regimen	<b>40</b>	<b>100.0</b>	0	0.0	0	0.0	0	0.0
<b>Patients' compliance to diet regimen</b>								
- Stuck to the described diet regimen	<b>33</b>	<b>82.5</b>	5	12.5	2	5.0	0	0.0
- Record diet regularly	30	75.0	8	20.0	2	5.0	0	0.0
- Measuring blood glucose before each meal	32	80.0	7	17.5	1	2.5	0	0.0
- Measuring blood glucose after each meal	32	80.0	7	17.5	1	2.5	0	0.0
<b>Commitment to the prescribed instruction for the physical activity</b>								
- Measuring blood glucose before any exercise	25	62.5	12	30.0	3	7.5	0	0.0
- Measuring blood glucose after any exercise	25	62.5	12	30.0	3	7.5	0	0.0
- Patients' compliance to exercise regimen	<b>30</b>	<b>75.0</b>	8	20.0	2	5.0	0	0.0
<b>Patients' compliance regarding using of stress management technique</b>								
- Avoid exposure to stress	34	85.0	6	15.0	0	0.0	0	0.0
- Practice stress management technique	<b>36</b>	<b>90.0</b>	4	10.0	0	0.0	0	0.0

**Table (4):** illustrates that, the vast majority (90.0%) of the studied patients always avoid stimulants like sweets. Also, all (100.0%) of them always comply to medication regimen. Moreover, the vast majority (82.5%) of them always stuck to the described diet regimen. Furthermore, three-quarters (75.0%) of them always comply to exercise regimen. Furthermore, the vast majority (90.0%) of them always practice stress management technique.

**Table (5): Relationship between sociodemographic characteristics of the studied patients and their total knowledge at pre and post implementation of a designed discharge plan (n=40).**

Items		Levels of total knowledge at pre intervention phase				X <sup>2</sup>	P-Value	Levels of total knowledge at post intervention phase				X <sup>2</sup>	P-Value
		Satisfactory (n=8)		Unsatisfactory (n=32)				Satisfactory (n=35)		Unsatisfactory (n=5)			
		No.	%	No.	%			No.	%	No.	%		
Age (year)	20-<30	1	12.5	12	37.5	8.307	0.041*	13	37.2	0	0.0	13.69	0.005**
	30-<40	6	75.0	4	12.5			10	28.6	0	0.0		
	40-<50	1	12.5	6	18.8			6	17.1	1	20.0		
	≥ 50	0	0.0	10	31.2			6	17.1	4	80.0		
Gender	Male	5	62.5	20	62.5	1.013	0.890	22	62.9	3	60.0	1.110	0.826
	Female	3	37.5	12	37.5			13	37.1	2	40.0		
Residence	Rural	2	25.0	8	25.0	8.045	0.047*	6	17.1	4	80.0	16.020.000**	
	Urban	6	75.0	24	75.0			29	82.9	1	20.0		
Occupation	Worker	6	75.0	8	25.0	8.800	0.038*	14	40.0	0	0.0	14.780.000**	
	Employer	2	25.0	6	18.7			8	22.9	0	0.0		
	Non	0	0.0	18	56.3			13	37.1	5	100.0		
Educational level	Can't read and write	0	0.0	8	25.0	17.69	0.000**	3	8.6	5	100.0	13.990.000**	
	Can read and write	0	0.0	6	18.8			6	17.1	0	0.0		
	Secondary education	0	0.0	12	37.5			12	34.3	0	0.0		
	High education	8	100.0	6	18.8			14	40.0	0	0.0		
Income	Enough	8	100.0	20	62.5	15.01	0.000**	28	80.0	0	0.0	17.120.000**	
	Not enough	0	0.0	12	37.5			7	20.0	5	100.0		

X<sup>2</sup> = Chi square test

\*Significant at p < 0.05.

No significant at p > 0.05.

\*\*highly significant at p < 0.01.

**Table (5)** presents that, there were highly statistically significant relation between total patients' knowledge at pre-intervention and their educational level and income at (P= < 0.01). Also, there was statistically significant relation with their age, residence and occupation at (P= < 0.05). While, there was no statistically significant relation with their gender at (P= > 0.05). In addition, the results reveal that, there were highly statistically significant relation between total patients' knowledge at post-intervention and their age, residence, occupation educational level and income at (P= < 0.01). While, there was no statistically significant relation with their gender at (P= > 0.05).

**Table (6): Relationship between demographic characteristics of the studied patients and their total risk for complications of diabetic ketoacidosis (n=40).**

Items		Levels of risk for complications of diabetic ketoacidosis						X <sup>2</sup>	P-Value
		High(n=2)		Moderate(n=5)		Low (n=33)			
		No.	%	No.	%	No.	%		
Age (year)	20-<30	0	0.0	0	0.0	13	39.4	<b>16.27</b>	<b>0.000**</b>
	30-<40	0	0.0	0	0.0	7	21.2		
	40-<50	0	0.0	1	20.0	9	27.3		
	≥ 50	2	100.0	4	80.0	4	12.1		
Gender	Male	2	100.0	3	60.0	20	60.6	<b>2.308</b>	<b>0.417</b>
	Female	0	0.0	2	40.0	13	39.4		
Residence	Rural	2	100.0	4	80.0	4	12.1	<b>14.37</b>	<b>0.000**</b>
	Urban	0	0.0	1	20.0	29	87.9		
Occupation	Worker	0	0.0	0	0.0	18	54.5	<b>18.04</b>	<b>0.000**</b>
	Employer	0	0.0	1	20.0	7	21.2		
	Non	2	100.0	4	80.0	8	24.3		
Educational level	Can't read and write	2	100.0	3	60.0	3	9.1	<b>15.69</b>	<b>0.000**</b>
	Can read and write	0	0.0	2	40.0	4	12.1		
	Secondary education	0	0.0	0	0.0	12	36.4		
	High education	0	0.0	0	0.0	14	42.4		
Income	Enough	0	0.0	0	0.0	28	84.8	<b>20.14</b>	<b>0.000**</b>
	Not enough	2	100.0	5	100.0	5	15.2		

**Table (6)** reveals that, there were highly statistically significant relation between patients' risk for complications of diabetic ketoacidosis and their age, residence, occupation educational level and income at ( $P = < 0.01$ ). While, there was no statistically significant relation with their gender at ( $P = > 0.05$ ).

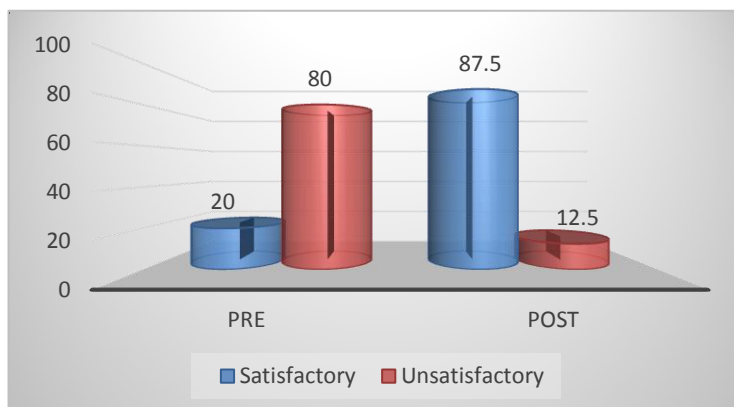
**Table (7): Correlation between total patients' knowledge and their level of risk for complications of diabetic ketoacidosis post implementation a designed discharge plan (n=40).**

Variables	Total patients' risk for complications of diabetic ketoacidosis	
	r	p
Total patients' knowledge	-0.537	0.000**

R= correlation coefficient test. P= p-value \*\*highly significant at  $p < 0.01$ .

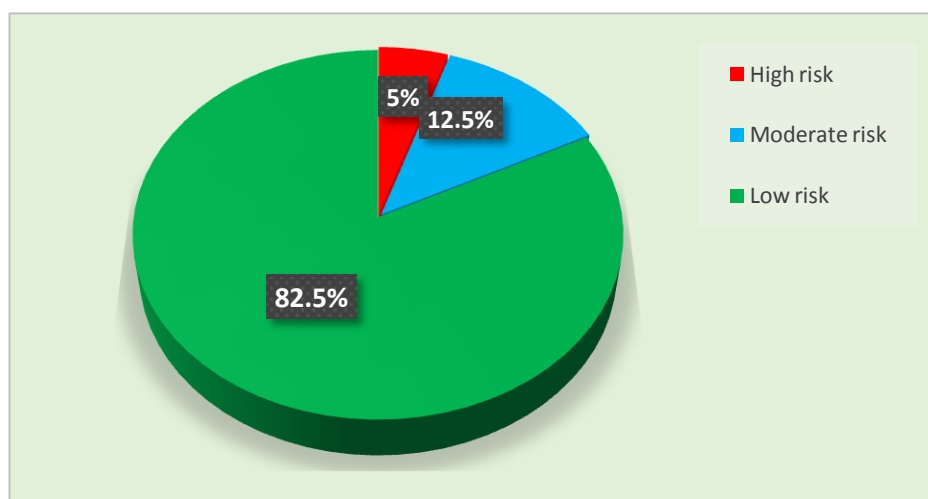


**Figure (1): Percentage distribution of total patients' knowledge about diabetic ketoacidosis at pre and post implementation of a designed discharge plan (n=40).**



**Figure (1)** shows that, (20.0%) of the studied patients have satisfactory level of total knowledge about diabetic ketoacidosis pre implementation of designed discharge plan. While changed to (87.5%) at post implementation of designed discharge plan.

**Figure (2): Percentage distribution of the studied patients according to their total risk for complications of diabetic ketoacidosis (n=40).**



**Figure (2)** shows that, (82.5%) of the studied patients have low level of total risk for complications of diabetic ketoacidosis. Also, (12.5%) of them have moderate level. While, (5.0%) of them have high level.

## DISCUSSION

Diabetic ketoacidosis (DKA) is one of the most serious complications after diabetes poor control, which seriously threatens human life, health, and safety. DKA can rapidly develop within hours or days leading to death. Discharge plans should include appropriate selection of insulin dosing and regimens as well as patient education to prevent recurrence of DKA<sup>(13)</sup>. So the current study aimed to determine the effect of a designed discharge plan on incidence of complication's among patients with diabetic Ketoacidosis.

As regard to age of the studied patients, the current study result showed that nearly one-third of the studied patients were aged between 20-<30

years old, the mean SD age was  $40.27 \pm 10.36$  years. This result was contrasted with **Shaker et al.**<sup>(14)</sup> who applied study entitled " Effect of Training Program on Nurses' Performance and Health Outcomes for Patients with Diabetic Ketoacidosis" and found that most of the studied patients were aged between  $30 < 45$ , with the mean  $\pm$ SD  $40 \pm 13.4$

As regard to patients' knowledge about the risk factors and symptoms of diabetic ketoacidosis at pre and post implementation of a designed discharge plan, the current study result clarified that there was a marked improvement in patients' knowledge about therisk factors and symptoms of diabetic ketoacidosis post implementation of a designed discharge plan with a highly statistically significant difference at ( $P = < 0.01$ ) between pre

and post implementation of a designed discharge plan. As evidence, one fifth of the studied patients had correct knowledge about the modifiable risk factors for diabetic ketoacidosis and less than one third of them had correct knowledge about symptoms of diabetic ketoacidosis at pre implementation of designed discharge plan. While changed to vast majority and all of them (respectively) at post implementation of designed discharge plan. From the investigator point of view this result reflect the effective of discharge plan on patients with Diabetic Ketoacidosis.

This result was in accordance with **Elaiwah et al.**<sup>(15)</sup> who applied study entitled "Level of awareness of diabetic ketoacidosis among diabetes mellitus patients in Riyadh" and found that the majority of participants had poor knowledge about the DKA risk factors and only a few had good knowledge, and about management of DKA while only a few had good knowledge. Also the majority of the participants had poor knowledge about DKA complication and a few had moderate knowledge

While this result was contrasted with **Ullah et al.**<sup>(16)</sup> who conducted study entitled "Knowledge of diabetic complication in patients with diabetes mellitus, Peshawar, Pakistan" and found that less than half of diabetic patients had poor knowledge regarding DKA as a complication of diabetes.

In relation to risk for complications of diabetic ketoacidosis, the current study result illustrated that the vast majority of the studied patients always avoid stimulants like sweets. Also, all of them always comply to medication regimen. Moreover, the vast majority of them always stuck to the described diet regiment. Furthermore, three-quarters of them always comply to exercise regimen. Furthermore, the vast majority of them always practice stress management technique.

From the investigator opinion this result may be due to health education obtained from health care providers through follow up and patients' perception and attitude related to disease. and these deficiencies could be due to that health care providers don't give due importance to health education of diabetic patients, low level of education among studied patients, and large number of diabetic patients admitted to clinic daily.

This result was accordance with **Debela et al.**<sup>(17)</sup> who applied study entitled "Characteristics of diabetic ketoacidosis in adult patients" and showed that highly percentage of the studied patients comply to medication regiment. Also this

result was in the same line with **Mohamed et al.**<sup>(18)</sup> who found that highly percentage of the studied patient adhere to the treatment. While this result was contrasted with **Platis et al.**<sup>(19)</sup> who conducted study entitled "Diabetic Patients' Quality of Life and Their Relationship in Compliance with Anti diabetic Treatment" and showed that patients adhere very little to a diet.

As regards to correlation between total patients' knowledge and their level of risk for complications of diabetic ketoacidosis post implementation a designed discharge plan, the current study result revealed that there was high significant statistical negative correlation between patients' knowledge post intervention phase and their level of risk for complications of diabetic ketoacidosis post implementation a designed discharge plan at  $p < 0.01$ .

This result was contrasted with **Abejew et al.**<sup>(20)</sup> who found that there was strongly associated with the occurrence of diabetic complication and knowledge level of patients.

## CONCLUSION

**In the light of the current study findings, it can be concluded that**

Discharge plan has a positive effect on incidence of complication's among patients with diabetic ketoacidosis. One fifth of the studied patients had satisfactory level of total knowledge about diabetic ketoacidosis pre implementation of designed discharge plan. While changed to the majority of them at post implementation of designed discharge plan. Additionally most of the studied patients had low level of total risk for complications of diabetic ketoacidosis. Also, more than one tenth of them had moderate level. While, minority of them had high level.

## RECOMMENDATION

**Based on the current study finding the following recommendations were proposed:**

- Raise the patients awareness about the most important symptoms of DKA causes, signs and symptoms, and prevention measures and the immediate action to be done for any incidence of this type of diabetes complication.
- Providing training programs for nurses in ICU to be followed in the routine nursing care for patients with DKA.
- Training programs for patients to decrease the incidence of complications, improve patients' outcomes, and reduce hospital length of stay.

**Recommendation for further researches:**

- Further research is warranted in order to

establish the awareness levels of diabetic patients along with their caregivers.

- More researches are needed to investigate the effectiveness of these program on other health outcomes and in the hospital stay.
- Replication of the study on large probability samples selected from different geographical area In Egypt is recommended to obtain data of more general is ability of findings.

## REFERENCES

1. **Shahid W, Khan F, Makda A, Kumar V, Memon S & Rizwan A (2020):** Diabetic Ketoacidosis: Clinical Characteristics and Precipitating Factors. *Cureus*, 12(10), e10792. <https://doi.org/10.7759/cureus.10792>
2. **Umpierrez G, (2020):** Hyperglycemic crises: diabetic ketoacidosis and hyperglycemic hyperosmolar state. *Diabetes Complications, Comorbidities and Related Disorders*, 595-614
3. **Abulebda K, Whitfill T, &Montgomery EE, Kirby ML, Ahmed RA, Cooper DD, Nitu ME, Auerbach MA, Lutfi R, Abu-Sultaneh S. (2019):** Improving Pediatric Diabetic Ketoacidosis Management in Community Emergency Departments Using a Simulation-Based Collaborative. Improvement Program. *Pediatr Emerg Care*.
4. **Joint British Diabetes Societies for inpatient care (JBDS- IP)(2021):** The Management of Diabetic Ketoacidosis in Adults\* <https://www.bsped.org.uk/media/1798/bsped-dka-guideline-2020.pdf>
5. **Jarelnape A, (2020):** Nurses knowledge about the discharge plan for patients after cardiac surgery at the Sudan Heart Institute. *Majmaah Journal of Health Sciences*, 9(2), 71-71.
6. **Lobchuk M, Bell A, Hoplock L &Lemoine J (2021):** Interprofessional discharge team communication and empathy in discharge planning activities: A narrative review. *Journal of Interprofessional Education & Practice*, 23, 100393.
7. **Wang Y, Lee W, Chou M, Liang C, Chen H, Yeh S& Shi H (2021):** Cost and Effectiveness of Long-Term Care Following Integrated Discharge Planning: A Prospective Cohort Study. In *Healthcare* (Vol. 9, No. 11, p. 1413). MDPI.
8. **Eledrisi M&Elzouki A, (2020):** Management of Diabetic Ketoacidosis in Adults: A Narrative Review. *Saudi journal of medicine & medical sciences*, 8(3), 165.
9. **Mohammed I.A, Mai. M, Adel, (2021):** Factors affecting glycemic control among Egyptian people with diabetes, attending primary health care facilities in Mansoura District. *the Egyptian Journal of Internal Medicine*, volume 33, Article number: 33.
10. **Abdelhamid Mahros (2013):** Impact of designed discharge plan on myocardial infraction patients outcomes. and modified by the investigator
11. **Mueller, R., and Knapp, T., (2018):** Reliability and validity. In *The reviewer's guide to quantitative methods in the social sciences*; (pp. 397-401).
12. **Mohajan, H., (2017):** Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University. Economic Series*; 17(4), 59-82
13. **AbdElkhalek Mekky, E., Ahmed Mohamed Hassan, H., &Ali Ibrahim, R. (2023):** Effect of an Educational Program on the Nurses' Performance and Patients' Health Outcomes regarding Diabetic Ketoacidosis. *Journal of Nursing Science Benha University*, 4(1), 488-504.
14. **Shaker, M. S., Abdelhady, M. S., &Faltas, S. F. M. (2020):** Effect of Training Program on Nurses' Performance and Health Outcomes for Patients with Diabetic Ketoacidosis. *Egyptian Journal of Health Care*, 11(2), 358-377.
15. **Elaiwah, R. I. B., Aldarsouny, A. T., Alshamrani, A. M., Almaslamani, A. M., Alsubie, B. F., Zainab, M. M.,...&Khalifah, A. (2020):** Level of awareness of diabetic ketoacidosis among diabetes mellitus patients in Riyadh. *Journal of Family Medicine and Primary Care*, 9(6), 2676.
16. **Ullah F, Afridi AK, Rahim F, Ashfaq M, Khan S, Shabbier G, (2015):** Knowledge of diabetic complication in patients with diabetes mellitus, Peshawar, Pakistan *J Ayub Med Coll Abbottabad*. 2015;27:360-3
17. **Debela, D. T., Kedir, M. M., &Desu, G(2022):**Characteristics of diabetic ketoacidosis in adult patients in FH Jimma, Oromia, Ethiopia, 2022.
18. **Mohamed, M. H., Farah, M. A., Ali, M. A., Mohamed, N. A., & Hassan, A. M. (2021):** Knowledge, Attitude and Practice on Common Diabetic Patients among Diabetic Complications at Egyptian Hospital in Mogadishu, Somalia. *Journal of Biosciences and Medicines*, 9(9), 87-99.
19. **Platis, C., Spanou, A., Messaropoulos, P., Kastanioti, C., &Zoulias, E. A. (2020):** Diabetic Patients' Quality of Life and Their Relationship in Compliance with Antidiabetic Treatment. *Case Study of Patients in a Public*

Hospital in Greece. WSEAS Transactions on Biology and Biomedicine, 17, 32-38.

- 20. Abejew, A. A., Belay, A. Z., & Kerie, M. W. (2015):** Diabetic complications among adult diabetic patients of a tertiary hospital in northeast Ethiopia. *Advances in Public Health*, 2015.