

Original Research Article

Assessment of Nurse's Knowledge Regarding Diabetic Ketoacidosis in Laâyoune City, Morocco

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Abstract: **Background:** Diabetic ketoacidosis represents a life-threatening complication of diabetes, standing as the foremost cause of mortality associated with the condition. The proficient management of patients suffering from diabetic ketoacidosis hinges upon the expertise and proficiency of nurses, who play a pivotal role in the comprehensive care and treatment of these individuals. **Aim:** The objective of this study was to assess the knowledge of nurses in the Department of Medicine and Intensive Care Unit at Moulay El Hassan Ben El Mehdi Hospital concerning the biological and clinical parameters, as well as the management protocols, for patients diagnosed with DKA. **Methods:** A self-administered questionnaire was distributed to nurses working in both the Department of Medicine (n=8) and the Intensive Care Unit (n=10) at Moulay El Hassan Ben El Mehdi Hospital in Laâyoune. The questionnaire included variables covering demographic characteristics, clinical information, and biological parameters. **Results:** The majority of nurses (88.8%) demonstrated adequate knowledge regarding the definition of DKA, with most nurses in both departments displaying familiarity with the biological and clinical manifestations of the condition. In terms of management practices, all nurses reported utilizing saline solution or glucose serum based on the patient's blood glucose levels. **Conclusion:** The study suggests the implementation of standardized educational programs within intensive care units to enhance nurse staffing, improve the level of patient care, and elevate the quality of care delivered to this patient demographic.

Keywords: Knowledge, nurses, diabetic ketoacidosis.

INTRODUCTION

Diabetes is commonly acknowledged as a significant public health challenge. It greatly impacts human health as a whole. In 2019, it was estimated by the International Diabetes Federation (IDF) that around 463 million adults aged 20-79 were impacted by diabetes [1]. If current trends continue, it is estimated that this figure will climb to 700 million by the year 2045. If left uncontrolled, diabetes can result in serious health complications including cardiovascular diseases, kidney failure, and neurological and metabolic disorders [2].

Diabetic ketoacidosis (DKA) is a serious metabolic issue that can occur as a complication of diabetes, characterized by high blood sugar levels, the production of ketones, and metabolic acidosis [3]. On the other hand, it is commonly seen in people who have type 1 diabetes but can also occur in individuals with type 2 diabetes [4].

Global estimates from the World Health Organization (WHO) indicate that DKA and hyperosmolar hyperglycemic state (HHS) are both life-threatening conditions with distinct features that necessitate hospital care from

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skilled medical professionals Furthermore, the possibility of high mortality rates remains significant following hospital admission as well [5].

Understanding the knowledge, attitude, and practice of paramedical staff regarding diabetes is key to implementing prevention measures. Accordingly, our study aims to assess the knowledge and competency of nursing staff regarding the management of diabetic ketoacidosis in the Department of Medicine and Intensive Care Unit at Moulay El Hassan Ben El Mehdi Hospital in Laâyoune City, situated in Morocco.

MATERIALS AND METHODS

Study Design and Setting: Our study was a prospective descriptive study of nurses from the Department of Medicine and Intensive Care Unit at Moulay El Hassan Ben El Mehdi Hospital in Laâyoune over 1 year from 1 January to 31 December 2021.

Study Population: In this study, nurses from the Department of Medicine and Intensive Care Unit at Moulay El Hassan Ben El Mehdi Hospital in Laâyoune were included. All nurses who were absent at the time of the study, regardless of the reason, and those who refused to participate, were excluded.

Study Size: 8 nurses working in the Department of Medicine (Option: General Nurses) and 10 nurses in the Intensive Care Unit (Options: General Nurses, Nurses in Anesthesia-Resuscitation, and Nurses in Emergency and Intensive Care) at Moulay El Hassan Ben El Mehdi Hospital in Laâyoune.

Data Collection: A self-administered questionnaire was intended for all nurses from the Department of Medicine and Intensive Care Unit at Moulay El Hassan Ben El Mehdi Hospital in Laâyoune. Variables collected included demographic characteristics, clinical data, and biological parameters.

RESULTS

Demographic Characteristics: Our results indicate a predominance of 56% of nurses working in the Intensive Care Unit as surveyed healthcare personnel in our study compared to those working in the Department of Medicine, who account for 44%. The female gender is predominant in both services, with 6 nurses in the Intensive Care Unit and 5 nurses in the Department of Medicine (**table 1**), and the majority of nurses in the Intensive Care Unit (n=6) are aged between 20 and 30 years old. In contrast, most nurses in the Department of Medicine (n=6) are aged between 30 and 40 years old. Also, our data revealed that the majority of nurses had between 1 to 5 years of experience.

Knowledge of nurses regarding Diabetic Ketoacidosis: Our data shows that the majority of nurses, whether in the Department of Medicine (46% or 7 nurses) or in the Intensive Care Unit (60% or 9 nurses), defined DKA as a state of metabolic acidosis associated with a total or relative deficiency in insulin (response 2) (**Graph 1**).

1. Increased insulin secretion associated with severe hypoglycemia.
2. State of metabolic acidosis associated with a total or relative deficiency in insulin
3. Increase in counter-regulatory hormone
4. Acute complication of diabetes

Knowledge of nurses regarding clinical signs of Diabetic Ketoacidosis: In the Department of Medicine, all nurses stated that the clinical signs of DKA include nausea, vomiting, and breath with a fruity odor. Additionally, among them, 7 nurses mentioned Kussmaul's breathing, 5 nurses mentioned abdominal pain, and 4 nurses mentioned polyuria and polydipsia.

In the Intensive Care Unit, 9 nurses affirmed that nausea, vomiting, and breath with a fruity odor are the most common clinical signs, with additional signs such as Kussmaul breathing, polyuria, polydipsia, and abdominal pain (**Graph 2**).

Knowledge of nurses regarding biological signs of Diabetic Ketoacidosis: All nurses surveyed in the Department of Medicine stated that the first biological sign of DKA is a blood glucose level above 2.5g/L. Furthermore, 7 nurses from the same department indicated that glycosuria and ketonuria are common, followed by other biological signs.

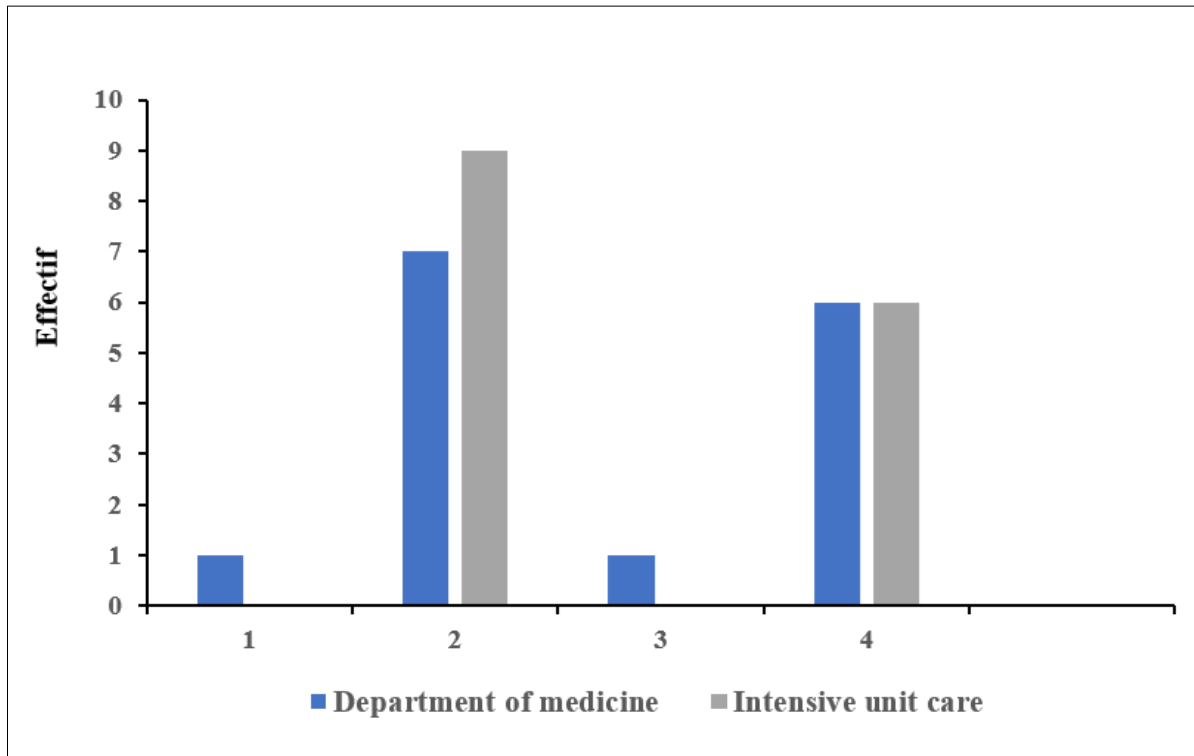
In the Intensive Care Unit, 9 nurses selected glycosuria and ketonuria. Moreover, 7 nurses affirmed that a blood glucose level above 2.5g/L is a biological sign, followed by a ketonuria level above 0.5 mmol/L, along with other biological signs (**Graph 3**).

Knowledge of nurses about the management of Diabetic Ketoacidosis: Our results show that in the Department of Medicine, all nurses use saline solution when the blood glucose level is above 2.5g/L. However, when this level is below 2 and 2.5g/L and in the case of collapse, the majority of nurses use glucose serum.

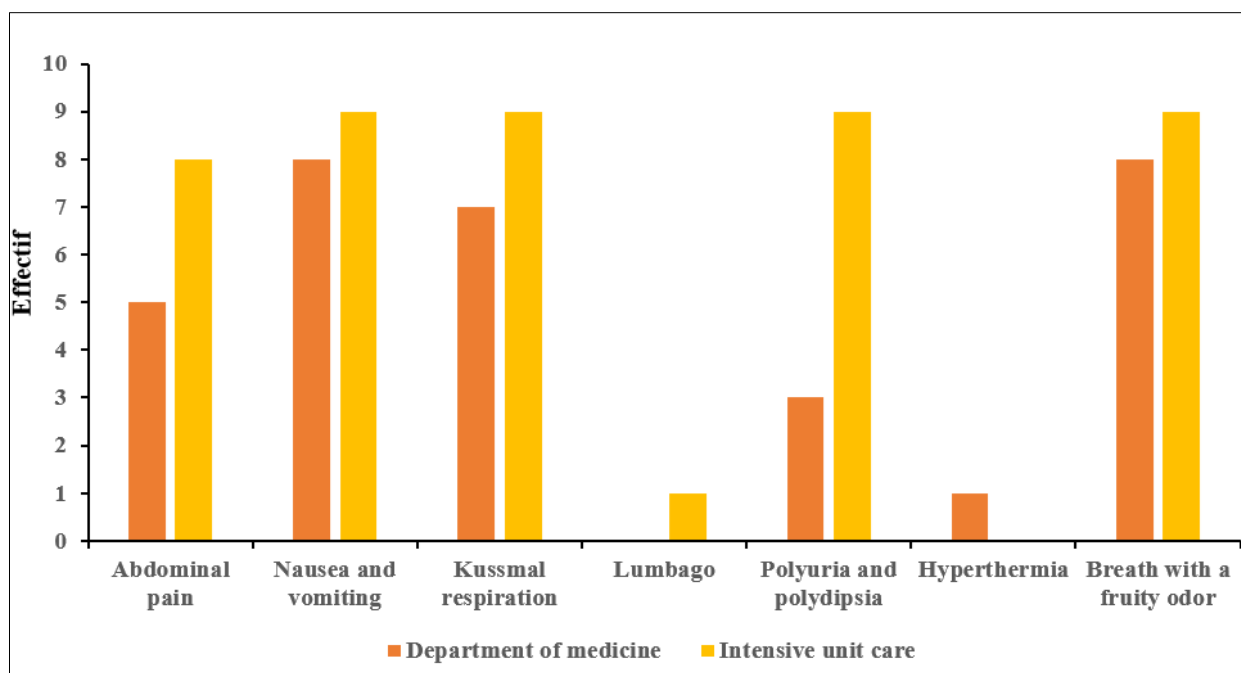
In the Intensive Care Unit, when the glucose level is below 2g/L, glucose solution is the most commonly used. However, when this level is above or below 2.5g/L, most nurses use saline solution. In the event of collapse, 80% of nurses use the macromolecule.

Table 1: Distribution of nurses by gender

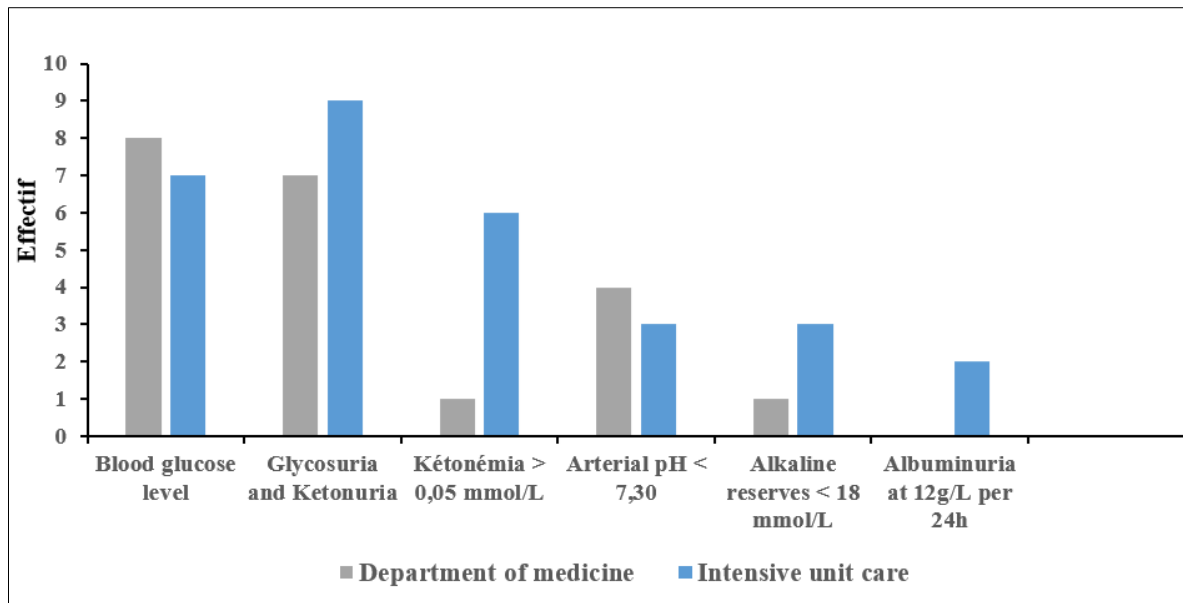
Sex	Department of Medicine	Intensive Care Unit
Female	5	6
Male	3	4



Graph 1: Responses of nurses regarding the definition of DKA



Graph 2: Responses of nurses regarding the clinical signs of DKA



Graph 3: Responses of nurses regarding the biological signs of DKA

DISCUSSION

The demographic composition of nursing staff within hospital departments varies significantly. Within the medicine department, a notable majority of nurses are women aged between 30 and 40 years, boasting a tenure ranging from 5 to 10 years. Conversely, the intensive care unit (ICU) exhibits a contrasting profile, with a predominant presence of nurses aged between 20 and 30 years, and a comparatively shorter professional experience, typically less than 5 years [5,6]. Currently, few research examining the tenure of nurses within the medicine and Intensive Care Unit (ICU) departments. However, existing literature suggests that competent nursing professionals tend to establish continuity within their work environment, typically spanning 2 to 3 years. During this time frame, nurses develop a keen awareness of their actions, aligning them with long-term objectives or strategic plans. This insight underscores the importance of investigating the tenure patterns of nurses within these critical healthcare settings, as it may offer valuable insights into workforce stability, skill development, and patient care outcomes [7, 8].

Our findings revealed that the majority of surveyed nurses demonstrated a proficient understanding of the definition, clinical manifestations, and laboratory indicators of diabetic ketoacidosis (DKA). It is hypothesized that the accurate responses observed among nurses in both departments can be attributed to self-directed learning initiatives and regular exposure to this metabolic emergency in their daily clinical practice. However, these findings contradict those of a study conducted by Allawi and Ahmed in 2023, which indicated that the majority of nurses exhibited insufficient knowledge regarding diabetic ketoacidosis [9].

The study's findings indicate that the majority of nurses demonstrate adequate comprehension of the clinical and biological parameters associated with diabetic ketoacidosis which is also reported by Kulkarni *et al.*, in 2019 [10]. However, earlier research has shown that most nurses exhibit limited knowledge concerning the administration of intravenous fluids for DKA patients [9]. Furthermore, previous studies have similarly underscored the insufficient understanding among registered nurses regarding IV fluid management for DKA patients [10].

Our results revealed that the majority of nurses exhibited good knowledge concerning the management of DKA. This result is consistent with a previous work in which the majority of nurses exhibited acceptable knowledge concerning insulin management and only half of the participants demonstrated acceptable knowledge regarding blood acidosis (50%), while knowledge about electrolyte balance was found to be unsatisfactory among 63.7% of nurses [9]. An earlier study revealed that (68.6%) of nurses had inadequate knowledge of how to care for patients with diabetic comas, and DKA (94.3%) of nurses had inadequate practices on how to care for patients with diabetic comas [6], While a previous study showed that the nurses' knowledge was 52.8% out of thirty-two respondents who had sufficient knowledge DKA management and 63.4% possessed sufficient knowledge about DM management [11].

CONCLUSION

In summary, the nurses exhibited a commendable understanding of the clinical and biological parameters associated with DKA. The study underscores the necessity for an educational intervention focusing on the management of DKA and diabetic patients, particularly for nurses assigned to emergency and intensive care units.

Competing Interests: The authors declare no competing interests.

Authors' Contributions: All authors read and approved the final version of the manuscript.

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