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Barriers and Strategies of Implementing DKA Care Set in the Emergency Department within the Banner System as Perceived by Nurses

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Abstract There are different barriers and strategies for implementing diabetic ketoacidosis (DKA) care set in the emergency department (ED). However, there is limited research on DKA care set in the ED. The current research tries to determine the barriers and strategies of implementing diabetic ketoacidosis (DKA) care set within the Banner system as perceived by nurses in the ED. The study utilized a qualitative descriptive method using a semi-structured face-to-face interview. Twelve (12) nurses from the Emergency Room(ER) aged 24 to 48 were the participants of the study. The qualitative inductive content analysis revealed four (4) main categories and themes regarding participant's perceptions about barriers of implementing the DK care set in E; these are; Knowledge, Experience and Competence in identifying cases of DKA, Communication, and Language. Findings demonstrate that it is essential that nurses should profound understanding of DKA to assess and distinguish its symptoms from other diseases. Hence, knowledge of DKA pathophysiology and competence to identify its symptoms is significant in delivering the appropriate management and care. The study posits that the identified barriers (knowledge, experience, and competence in identifying cases of DKA, communication, and language) significantly affect the success of implementing the DKA Care Set. A collaborative effort is significant in the care of DKA patient; therefore, there is a need for a nursing staff education and training to enhance protocol adherence of protocol throughout DKA.

Keywords: *diabetic ketoacidosis, treatment of hyperglycemia in ER, DKA management, DKA guidelines, DKA management algorithm*

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1. Introduction

The prevalence of diabetic patient suffering from diabetic ketoacidosis (DKA) has increased worldwide. Delayed in presentation, diagnosis, and complications of management have dramatically affected the number of its morbidity and mortality. [1] Diabetic Ketoacidosis or DKA is a severe complication of diabetes that can be life-threatening. It caused an average of 130,000 hospitalizations each year [2] and usually occurred in patients with type 1 diabetes, but it may also occur in patients with type 2 diabetes, non-insulin dependent diabetes [3].

These patients are treated by the intensives using the Banner approved comprehensive protocol titled "DKA Care set." The Intensive Care Unit (ICU) is the preferred unit of placement in this facility due to frequent laboratory testing, IV insulin titration, and aggressive fluid and electrolyte management. Once stabilized in the ICU, the patient can transition to a medical floor to receive diabetic education and prepare for discharge. The average length of in-patient stays for patients with DKA as the first-listed diagnosis is 3- 4 days. [5]

We recognize that emergencies are often stressful situations as well as with the variations of ordering options in the Emergency Department (ED) and the benefits of the comprehensive "DKA Care set" being utilized in the ICU, there is a need for a quality improvement scheme to update the workflow and improve patient care in the ED. Many barriers are known for implementing DKA care set in ER, such as knowledge and experiences of nurses, difficulty in distinguishing cases of DKA from other illnesses, language, and communication, comfort with assessment [6]. Such barriers remain a significant obstacle in the management of DKA patients [7]. Otherwise the implementation of the "DKA Care Set" as new strategies in the ED to provide initial caring and stabilization, in comparison to waiting for management in the ICU, provide patients with more timely care and decrease time to resolution.

2. Significant of the Study

Exploring the barriers and strategies of implementing DKA care set in ED within the Banner system may address the cause of delay and failure to identify its symptoms and provide its immediate management and care. Also, appropriate intervention can be implemented to promote special DKA care set for diabetic patients to facilitate workflow in the ED and minimize ICU admission and length of time from patient admission to DKA resolution.

3. Methods

This study used descriptive methods to examine the barriers of implementing diabetic ketoacidosis (DKA) care set as perceived by nurses in the ED. The goals of the qualitative descriptive study are to adequately describe the individuals experience in everyday language and understand the meaning of their experience [8]. From this perspective, we reflect on the barriers experienced by the nurses in applying DKA care set in the ED. We describe and explain how nurses' perceptions of DKA care set affect their intervention and decision to care for a patient admitted with DKA manifestations.

3.1. Sample and Setting

A non-probability convenience sampling was used to collect in-depth information and to attain ample data relevant to the research question. Twelve (12) nurses who are working in ED of King Fahd Hospital Al Madinah - Saudi Arabia are the sample of the study. Samples represent various nationality such as four (4) Filipino nurses, six (6) Saudi Arabian and two (2) Indians, who met selection criteria and agreed to participate. Using a sample of newly graduated nurses may provide a better understanding of perceptions specific to knowledge and experience. We sought to draw a sample regarding nurses' experiences when they encounter DKA patients from different cultures and their perception of what helps them deliver competent care.

The criteria of the study include females and males' nurses, ages 24 to 46 years, had a bachelor degree in nursing as the minimum education, their experiences in ER is from two years to more than ten years, able to understand English and agreed to give informed consent. Exclusion criteria were: Nurses who refuse to participate in the interview.

3.2. Data Collection

Participants were recruited from nurses in ED at King Fahd Hospital Al Madinah, Kingdom of Saudi Arabia. Participants signed informed consent after providing a complete explanation of study requirements. Socio-demographic data (age, marital status, educational level, years of experience, employment status, and courses attended about diabetes mellitus was obtained from the participant self-report. The study was conducted from April to August 2018.

Investigators conducted a long semi-structured face-to-face interview with each participant. Interview questions were kept simple and used an interview guide (Table 1) that was developed from issues arising from relevant literature. All interview was audio-taped that lasted for 30 to 45 minutes. All were conducted in English, in the nurses' station in ED and transcribed by the investigators.

Table 1. Participant's perceptions about barriers of implementing the DK care set in the ER

Main categories and themes regarding participant's perceptions about barriers of implementing the DK care set in the ER.
* Knowledge and Experience. * Difficulty of identifying cases of DKA. * Comfort with Assessment. * Communication and Language.

3.3. Interview Guide Questions

1. Tell me what is your understanding of the term and precipitating factors of diabetic ketoacidosis (DKA)?
2. In your opinion, what are the barriers to implementing the DKA care set in ER areas?
3. Tell me in your opinion implementing the "DKA Care set" will decrease the length of time from patient admission to DKA resolution?
4. Talk to me about your suggestions, ideas, or tools that would help you as a staff nurse to provide care to a patient with DKA?

3.4. Data Analysis

This study used a phenomenological, hermeneutic approach inspired by the French philosopher, Ricoeur's, theory of interpretation. The interviews are analyzed by the investigators using the qualitative inductive content analysis method. [9]

3.5. Naive Reading

All interviewees, from nurses, undertook the reading. While the interviews/texts were read and re-read, the immediate impressions from the texts were transcribe in order to hold on to what has moved us in relation to 'what is said' and to the questions that emerge the informants were talking about the barriers and strategies of implementing DKA care set in ER as in Banner system. This led to initial steps in understanding the significance of how the nurses perceived. Structural analysis:

The transcripts of the interviews were qualitatively analyzed using the method of thematic analysis. The thematic analysis involves 'identifying, analyzing, and reporting patterns (themes) within data. The final list of categories and themes afterthe qualitative inductive content analysis is presented in Table 1.

4. Results of Interviews

4.1. Characteristics of Respondents

The socio-demographic and clinical characteristics of the participants are presented in Table 2. The average age

was 35 years (range 24 – 46years) old. One hundred percent of the participants had at least a bachelor degree, and a majority of them was married. Also, most undergo training courses regarding diabetic mellitus.

Table 2. Socio-demographic Profile of the participants (n=20)

Age =	(24-46).
Mean ±SD	(30.5 ± 6.70)
Level of education. =	Bachelor degree (100%)
Years of experiences.	
	> 5 years 8 (40%
	< 5 years. 12 (60%)
Attending courses related to (DKA).	
	Yes 2(10%)
	No 18(90%)

Descriptions of each theme with exemplary quotes of the barriers and strategies used to overcome the barriers can be:

4.1.1. Knowledge and Experiences

Participants perceived that lack of knowledge and training can impede information delivery and limit the nurses' ability to recognize and adhere to the manifestations of DKA effectively. Specifically, the lower educational requirements of nursing staff as compared to those of other health professions were also perceived as a barrier, aside from participants with a new experience in ER when caring the DKA patients on admission.

Understanding the term and causes of diabetic ketoacidosis (DKA) posed difficulties for distinguishing the manifestations of DKA from other sicknesses. Otherwise, the dissemination of knowledge leads to interprofessional collaboration with physicians and improves the quality of healthcare for a critical patient population like DKA. “Usually I deal with these cases as hyperglycemic until the physician write the diagnosis “(Participant from New experience nurses). On the other hand, some participants recognized that strategies of implementing the DKA care set as the Banner system could help the nursing staff in ED and guide the nurses for appropriate nursing care for such cases.

4.1.2. Difficulty Identifying Cases of DKA:

A key barrier discussed in every focus group was that it is difficult to tell the difference between cases of DKA and other types of illness. The issue of difficulty in identifying cases of DKA also extended to the recognition that it is even difficult for new experienced nurses to identify cases. “Because hyperglycemia can be with multiple physical complications, it is normal to have high blood sugar. So how do you tell the difference?” (Participant from the new experienced nurse).

Some participants said that they only felt able to recognize the symptoms of DKA after caring patients admitted with the same diagnosis. “Once they experience symptoms of DKA for the first time, then they can, more aware of it” Participant more than five years’ experience.

The meaning of difficulty in identifying cases of DKA theme also extended to the recognition that it is even difficult for experienced nurses to identify cases. However, nurses may have a concern about recognizing cases of DKA may get more comfortable with. (“I think that the younger patients with type 1 diabetes find it more difficult, compared to patients with type 2 diabetes who already know what is coming, (Indian nurse participant).

4.2. Comfort with Assessment

This theme describes the emergency nurses' perceptions regarding comfort with the assessment of DKA patients as well as during focus group interviews. Emergency nurses verbalized lack of comfort with assessing patients admitted with DKA, as well as the desire to have more trained nurses available for caring such cases. One nurse stated that DKA care set could be used as a guideline can be relived any intimidating. ``I think the care set will guide me during the assessment DKA``.A second nurse said, "I think the most significant barrier is the comfort level. I keep thinking about making the decision. Although barriers to DKA assessment were obvious, Emergency nurses in this study stated that implementing the care set give space of comfort during the assessment of DKA.

4.3. Communication and Language

This theme describes that communication and language barriers can cause several problems in the emergency department during caring cases like DKA. The problem that was identified includes; more extended stay of the patient, unable to understand prescriptions and instructions, an increase in hospital expenses. The emergency department has an interpreter available, but usually, they are under-utilized. “I fell that patients who are non-English speakers were less satisfied with their care in the ED, and reported more problems with emergency care.” (Participants from Philippine nurses).

The participant from Saudi Arabian nurses said that "with appropriate verbal communication I could understand the patient’s problems”.

5. Discussion

A qualitative approach was utilized in this study to explore the barriers and strategies of implementing DKA Care set” within the Banner system in the emergency department as perceived by nurses. Evidence-based practice in nursing has received much attention, and discussions continue around the barriers that nurses face in implementing and sustaining this standard of practice. This qualitative study provided participating nurses an opportunity to describe from a clinical perspective the barriers they perceive to EBP to DKA care set implementation. Through this study, nurses described the challenges that they were experiencing while caring for patients admitted to ER with manifestations of DKA and identify the barriers and strategies for implementing DKA care set. It is consistently among the majority of studies dealing with an evidence-based practice that concerns barriers to guideline implementation rather than outcomes. When reading across studies, nurses heed multiple complex barriers to successful guideline implementation. These barriers have confounded attempts to move evidence-

based practice towards systematic documentation of improvements in patient care and nurses' training. There were some notable gaps in the literature encountered. Studies documenting improved outcomes after successful guideline implementation would be a valuable addition to the research in this area. Another noteworthy difference is the lack of literature specific to clinical practice guideline implementation in the emergency department setting.

The majority of previous studies used questionnaires for gathering their data for determining the barriers of implementing care set while caring DKA patients in various critical hospital area; therefore, the results must be matched with the findings of this study which used the qualitative design. While clinical knowledge is necessary, clinical reasoning and management skills are critical for successful patient management, when described the barriers related to knowledge and experience whether nurses have the knowledge needed to recognize the manifestations of DKA patients effectively. Knowledge and experiences of nurses was a barrier for some disciplines, but an enabler to others in providing evidence-based assessment and intervention for DKA cases. Disciplines such as pathophysiology of DKA seemed to know the research well, and how to deliver named interventions. Nurses are one of the vital people that play a significant role in the treatment of diabetic patients and should be well equipped to perform recommended standards of care. A Cochrane review revealed that trained nurses could indeed replace physicians in various aspects of diabetes management [10]. On the other hand, [11] it is reported that initial training only provided them with half of what they needed to know, and they learned the remainder informally on the job. Also, in another study investigating the educational needs of licensed nursing staff that provide end-of-life care, lack of knowledge and skills and communication difficulties were cited as significant needs areas. [12]

Therefore, the DKA guidelines and technical reviews in the field that was published by several societies supported the strategy that may be beneficial for nursing staff in the ER which include following focused guideline DKA care set review and guidance while caring for DKA clients and efficiently deliver current knowledge to the bedside. [13,14,15,16]. Also, developing standardized in-patient protocols for DKA management is another approach to apply to be able to achieve the best clinical practices.

Several studies stressed the safety and efficiency of a protocol directed care as it significantly decreases the length of stay in hospital of a patient with a hyperglycemic crisis without increasing the rate of iatrogenic complication. [17,18] Recently, a retrospective review was conducted at one of the university teaching hospital in the United States on the efficacy and safety of DKA protocol of the American Diabetes Association 2009. It has been found out that the patient who is under this treatment protocol experienced a decrease in time resolution of more than 10 hours without increased rates of iatrogenic hypoglycemia or hypokalemia. [19] The same protocol in the study was used to determine the time of attaining metabolic control achieved in a randomized controlled trial. [20,21]. The study support [22] who stated that the knowledge translation is the synthesis, dissemination, exchange, and application of knowledge to improve health, provide more effective health services, and strengthen the health care system.

The participant from newly graduated nurses in ER verbalizes the need for physicians' consultation while dealing with DKA cases. Suboptimal care was an outcome of other studies as a result of low adherence stemming from the discontinuity of nursing care, understaffing, and little experience in the care of DKA patients. [23,24] Hence, an on-going nursing staff education and training will be needed to enhance DKA protocol adherence aside from the collaborative effort of experienced medical staff and nursing specialist. [25]

Participants emphasized the difficulty in distinguishing cases of DKA from other illnesses as another key barrier for caring of DKA patient, as DKA is a medical emergency necessitating an hourly assessment of a myriad of dynamic clinical parameters, resulting in numerous critical decision-making points, which are further complicated by the complex interplay between management actions [14] Pawlowicz et al. reported similar findings in a study from Poland, where the wrong interpretation of diabetic symptoms leads to a delayed diagnosis of DKA [26] on the same line [27,28] stated. The incidence of severe DKA and complications of shock, renal failure, were notably higher in patients with the missed diagnosis.

During focus group interviews, emergency nurses verbalized the lack of comfort in assessing DKA cases and perceived that they almost keep thinking of appropriate intervention. This finding discussed by many studies that significant differences in clinical decision-making in complex situations like DKA between novice and expert nurses necessitate a better understanding of sound pathophysiology with continuous manipulated practice. [29] Also mentioned that highlighted the complexity of decision-making and concluded that, while knowledge is a pre-requisite for the decision, other factors such as metacognition (thinking about thinking) also affects clinical reasoning. To maintain patient safety, improve patient outcomes, and decrease delays in care, the nurses need to recognize and initiate timely and appropriate interactions by using appropriate decision-making strategies.

However, Filipino and Indian nurses in this study stressed the barrier of language and communication in applying the DKA set.

This finding supported by many studies, that stressed the difficulty in establishing communication if there is a difference in the language spoken. Non-verbal communication also varies from a different culture, and each has its interpretation. Moreover, the patient is less acceptant of nurses with different language and culture (culture has an impact on one's attitude and behavior). Cultures and religion vary in their communicative needs and ways of expressing emotions. That is why nurses should have sufficient knowledge of this, as to avoid pre-judgment or prejudice when communicating with the patient. Indeed, culture can be both facilitator and barriers to communication [30]. The finding of the study on the same line, [31] studied the experiences of Emergency Department (ED) nurses when dealing with non-English-speaking patients. There was a delay in care because the nurse had to interrupt their nursing assessment to look first for a translator who was not always available. Lack of

interpreters can be a significant concern as nurses were using family members as interpreters. Sometimes some information is withheld by the patient as it could affect their relationship with the family or the patient did not receive a piece of essential information because of a different interpretation of the family members. The finding indicates that to implement DKA care set as teaching methods like that are sensitive to language and culture, ensuring that nursing staff understands the content which must be written by Arabic and English languages with facilities for translator available in ER continuously. Therefore, there is a need for on-going nursing staff education and training on protocol adherence. Caring for DKA patient should be a collaborative effort that includes the expertise of, medical staff, and nursing specialists.

6. Conclusions

Findings demonstrate that it is essential that nurses should have a profound understanding of DKA to assess and distinguish its symptoms from other diseases. Hence, knowledge of DKA pathophysiology and competence to identify its signs and symptoms is significant in delivering the appropriate management and care. The study posits that the identified barriers (knowledge, experience, and competence in determining cases of DKA, communication, and language) significantly affect the success of implementing the DKA Care Set. A collaborative effort is significant in the care of DKA patient; therefore, there is a need for a nursing staff education and training to enhance protocol adherence of protocol throughout DKA.

7. Limitations

The small sample size is the limitation of this study. These influence the data collection, analysis, and ultimately, the study findings. The data collected is from one hospital in Saudi Arabia is another part to consider. The data presented here may not correspond to the opinions of other nurses who are working in other hospitals.

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