FACTORS LEADING TO DKA READMISSIONS: A QUALITATIVE STUDY

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Introduction

In 2015, 30.3 million Americans had diabetes and each year 1.5 million more Americans are diagnosed with diabetes (ADA, 2018). Diabetes Mellitus (DM) is characterized by the body's inability to produce insulin properly or insulin is not used at the optimal ratio to allow glucose to enter the cells (DaVita Inc., 2018). Type II diabetes, a variant of DM, is where the body does not produce enough insulin to match the glucose levels, or the body does not utilize the insulin correctly, also called insulin resistance (DaVita Inc., 2018). Type II diabetes is common in obese persons as well as those over the age of 45 years old (DaVita Inc., 2018). One complication from uncontrolled diabetes is diabetic ketoacidosis (DKA). When an individual has DKA, there is an insufficient amount of insulin compared to glucose in the bloodstream (Mayo Clinic, 2018). Due to the lack of insulin, cells do not get the energy they need and as a result, fat is broken down for fuel. The fat metabolism causes ketones to build up in the blood stream (Mayo Clinic, 2018). This causes extreme blood glucose levels that requires hospitalization and treatment by medical professionals to correct and prevent coma or death.

More emphasis has been placed on research related to diabetes to combat its complications and prevent re-hospitalizations related to exacerbations of DKA. Diabetes is a complex disease that is influenced by many social components that must be controlled in order to properly manage the disease. Social support plays a key role in management of diabetes and prevention of DKA. Patients with DKA must be admitted into the hospital and some people readmit frequently. Nationally, the hospital readmission rate for patients with diabetes is 14.1% to 21.0% (Langley, Butler, Tesseneer, & Artman, 2015). Further, patients with diabetes readmitted with diabetic ketoacidosis account for more than 130,000 readmissions per year with an annualized cost of $2.4 billion for the intensive care required (Langley et al., 2015). Learning

"why" diabetic patients readmit to the hospital for DKA and what stressors played a factor in their lives leading up to their admission to the hospital will contribute to the understanding of their specific experience with diabetes.

Background

Social Determinants of Health

Social determinants of Health (SDOH) are factors in people's lives that make an impact on their health. SDOH include "socioeconomic factors, psychosocial factors, neighborhood environment, and political/ economic/ cultural drivers (Walker, Williams, & Egede, 2016, p.368)." Socioeconomic factors can include presence of social support, access to opportunities, and limits of poverty can make an impact on health (Social Determinants of Health, 2018). Psychosocial factors are ones that affect mental health and social conditions, and neighborhood conditions can impact the availability of resources, transportation options, and the natural environment (Social Determinants of Health, 2018). Politics and the economy play a role in health as it can impact society's views, the government's focus, and the current culture (Social Determinants of Health, 2018). Overall, the SDOH intertwine together but collectively play a role in impacting health. Diabetes Mellitus is a complex disease and the management of diabetes is difficult for many because SDOH are major contributors to managing their health (Walker, Williams, & Egede, 2016, p.368). Management of diabetes includes the various traditional pharmaceutical interventions that keep blood glucose under control, but many other factors influence the health of diabetic patients, including SDOH. Some patients that are admitted to hospitals due to DKA receive medical treatment but are frequently readmitted due to loss of glucose control. SDOH may help describe the factors that contribute to readmissions and allow professionals to address these issues.

Through a SDOH lens, the reasons behind DKA readmissions can be explored in an attempt to help understand how factors beyond medical management influence the diabetic patient's ability to appropriately manage their disease. Walker, Gebregziabber, Martin-Harris, and Egede (2014) found the most impactful socioeconomic factors were education and income and the strongest psychosocial factors were self-efficacy and stress. Stress affected self-care behaviors and increased chances of depression among diabetic patients (Walker, Gebregziabber, Martin-Harris, & Egede, 2014). Further, psychological stress and social support can complicate the mental and physical aspects of an individual as seen through self-care behaviors and glycemic control (Walker, Gebregziabber, Martin-Harris, & Egede, 2015). Additionally, Heltberg et al. (2017) found better structured personal diabetes care positively influences diabetes related outcomes, however, socioeconomic disparities lead to mortality and morbidity despite interventions. The socioeconomic factors that influence diabetes management in patient's lives have an impact on their outcomes and personal care.

While research on SDOH and diabetes focuses on the impact of the disease as a whole, few have investigated what specific social structures or supports patients need to better control their diabetes. To understand the impact of diabetes, learning how diabetic ketoacidosis can be impacted by SDOH can aid in informing diabetics and health care professionals. Without the literature on this topic, a gap exists that limits the public from being able to learn about these impacts and then apply them into their lives.

Social Support

Of the major SDOH, social support, has shown to make a big effect on the health and well-being of patients. Weaver, Lemonde, Payman, and Goodman (2014) looked at how diet can be impacted by economic, social, and cultural resources. They found that these resources

undermine dietary management most in low socioeconomic classes and deterred them from maintaining a healthy diet (Weaver, Lemonde, Payman, & Goodman, 2014). While some look at the overall socioeconomic factors, others look directly at the neighborhood environment and how this impacts the life of a diabetic patient. Smalls, Gregory, Zoller, and Egede (2014) found that access to healthy foods and social support had more of an impact on self-care behaviors than neighborhood violence and aesthetics. While most social support plays a positive role, negative factors of social life can be seen by the influence of discrimination on stress, but overall social support shows a direct correlation with better diabetes outcomes (Achuko, Walker, Campbel, Dawson, & Egede, 2016). While many socioeconomic factors influence diabetic patients, social support has been found to have a direct correlation with diabetes outcomes and the progression of the disease.

Readmission Contributors

Diabetic patients readmit into the hospital for diabetic ketoacidosis frequently but the rationale behind these readmissions vary depending on the patient. One study in Scotland found that the DKA incidence was fairly low but many of the patients need high intensity care to regain their health (Ramaesh, 2016). Furthermore, the rates of readmission rose for up to 5 years after the initial hospitalization indicating that this diagnosis tends to lead to more hospitalizations in the future (Ramaesh, 2016). Another study confirms this trend and presents risk factors that make patients more likely to readmit which include age, blood glucose, physicians, insulin dosage and vital signs (Yan, Gushulak, Van Aarsen, Hamelin, Wells, & Stiell, 2017). Other risk factors include drug and alcohol abuse, minorities, comorbidities, and government insurance that may lead to more DKA readmissions (Bradford, Crider, Xu, & Naqvi, 2017). This could be due to healthcare providers requiring tighter blood glucose control on non-readmitted patients and

then those patients end up having better glucose control after discharge (Tang & Kouides, 2014).

After knowing that the readmissions occur, Baggio, Santos, Sales, and Marcon (2013), sought to

find the reasons for readmission and how they perceive their disease. Interviews showed the way

a person suffers from DM is related to their socioeconomic status, therefore leading to more

readmissions for lower status patients (Baggio, Santos, Sales, & Marcon, 2013). The statistical

rates of readmission set the scene for understanding why patients readmit into the hospital for

DKA.

Readmissions into the hospital for diabetic ketoacidosis happen to some and discovering

the factors that cause those readmissions can help to reduce readmission rates. Literature looks at

some of the reasons that patients readmit, but few look through the lens of social determinants of

health. Another area in need of research is the social support impacting patients readmitting for

DKA. Without this literature, patients and health care providers miss out on exploration of social

determinants of health affecting the readmissions for diabetic ketoacidosis.

Interventions to Prevent Readmissions

Based on the research, interventions become necessary in order to improve diabetes

outcomes and prevent readmissions into the hospital. Rubin, Donnell-Jackson, Jhingan, and

Paraniape (2014) looked into what causes readmissions in diabetic patients within 30 days of

discharge. Interventions such as additional education and discharge instructions benefitted the

patient most in order to reduce the rate of early readmissions (Rubin, Donnell-Jackson, Jhingan,

& Paraniape, 2014). Another found that interventions specifically tailored to patients that address

psychosocial factors improve mental health and develop social support in order to reduce the risk

of readmission among diabetic elderly patients (Alavi, Baharlooei, & AdelMehraban, 2017).

While some found suggested interventions, others actually implemented their interventions to see

the impact on diabetic patients. Aziz, Riddell, Absetz, Brand, and Oldenbrg (2018) used peer

support programs to create a positive impact on the quality of life in type 2 diabetics and

therefore, increases the effectiveness of the program for the participants. An alternative

intervention utilized a program that increased patient communication with health care providers

through texting and phone calls (Mayberry, Berg, Harper, & Osborn, 2016). The Family-Focused

Add-On for Motivating Self-Care or FAMS program was found to increase self-care behaviors

by improving social support through increasing provider-patient communication in the diabetic

patients in order to benefit the overall health and longevity of the patient (Mayberry, Berg,

Harper, & Osborn, 2016). Interventions focused on improving social support have shown to be

especially effective at improving diabetes outcomes.

      Interventions are crucial factors in treating patients so learning more about interventions

for diabetic ketoacidosis beyond medical care is pertinent to treating patients holistically. Few

interventions exist that address SDOH impacting diabetic ketoacidosis readmissions. Since social

determinants of health make an impact on diabetes, finding interventions that aid in addressing

these factors in order to prevent readmissions for DKA will better the health of patients.

Purpose

      This study sought to provide insight into how patient social stressors relate to DKA

readmissions. Using the SDOH framework, we can dive deeper into the various factors that

influence readmissions. We can also see how social support impacts patients as they readmit into

the hospital for DKA. In many instances, patients present with life threating conditions that may

overshadow the social factors that contributed to the readmission. The purpose of this research is

to describe the contributors to DKA readmission from a SDOH lens. This study will take a

personal view into the lives of diabetic patients admitting frequently with DKA.

Methodology

Study Design

This study used a secondary descriptive qualitative analysis on data already collected by my mentor, Dr. Thompson Forbes. Qualitative approaches encourage discovery and cultivates descriptive and inductive findings (LoBiondo-Wood & Haber, 2018). This study intends to see issues from another person's perspective while they are recovering from DKA. This research attempts to see what factors happen in people's lives that lead to readmissions for DKA (LoBiondo-Wood & Haber, 2018). The responses by patients provides descriptive data that was analyzed for connections and associations. Descriptive analyses portray phenomenon from a new perspective and exploring a new topic for others to experience (LoBiondo-Wood & Haber, 2018).

Assessment/ Data Collection

Data was collected from already conducted qualitative interviews of patients readmitted for DKA. The study received IRB approval from East Carolina University. The data was collected through interviews from individual patients and from a primary support person. Participants were recruited over a 10-month period between 2016 and 2017. Patients and support persons provided consent and a researcher on the team scheduled and completed interviews. Interviews from the parent study were conducted through phone calls or in-person at the southeastern medical center where patients were admitted. Interviews were then transcribed by a professional transcriptionist and reviewed by the study team for accuracy. I conducted an in-depth analysis of four transcripts to see what stressors patients stated were present during their DKA exacerbation and may have contributed to their admission to the hospital.

Sample/Setting

A purposive sampling strategy was utilized to select the study participants. Characteristics of study participants include those that readmit frequently for DKA in order to see the factors leading to the admissions. Admission records were reviewed daily in order to find eligible patients. To be eligible, patients must meet the following criteria: (a) 18 years old or older, (b) admitted to the hospital as a result of a DKA episode and have a prior admission for a DKA at least two additional times in the previous twelve months, (c) verbal and written fluency in English or Spanish, and (d) preferably had one member of their social support system committed to being interviewed in the hospital setting prior to the patient's discharge . Exclusions included patients who (a) had been diagnosed with gestational diabetes and (b) demonstrated mental confusion or illness (e.g., dementia, psychosis, mania) that would compromise the patient's ability to provide consent. Eligible patients were requested to name a support person to participate and they had to be at least 18 years old and able to speak the patient's language. The support persons and the patients were interviewed over the phone or face-to-face at this Magnet recognized institution. The setting for this study was at a southeastern medical center that serves more than 1.4 million patients across 29 counties. My mentor will select the transcripts for this study.

Analysis

I performed a qualitative content analysis in order to find how diabetic patients interact before their admission into the hospital for DKA. Qualitative content analysis best provides a contribution to a topic rather than a search for a solution (Graneheim & Lundman, 2004). At the beginning of this analysis process, I reviewed the interviews completely and highlighted key phrases from the interviews. By using the SDOH framework, categories were created to describe

the highlighted statements found throughout the interviews. These categories included exercise, occupation, spirituality, support, diet, education, optimism, health knowledge, finances, housing, and emotions. From these categories, interpretations were formed to develop themes and to extract the meaning behind the themes from the participants. Themes were reviewed by my mentor as analysis progressed to ensure they reflected the voice of participants in their study.

Results

Four participant interviews were analyzed in this study. The majority of these were male (75%) from ethnic minority groups (100%). It was found that poor self-care prioritization, social support reliance, and financial unpredictability were the main factors that led to these patients readmitting into the hospital for DKA. In addition, a theme found throughout the interviews, hospitalization hope, contrasted the previously mentioned barriers to health. The barriers to diabetes management as stated above balance with hospitalization hope only slightly in preventing patient's risk of readmission for DKA (see Figure 1). The results of the data analysis show the ways SDOH, such as social, financial and others, can impact a patient's propensity for readmitting with DKA.

Poor Self-Care Prioritization

Many participants knew diet, exercise, and diabetes knowledge impact health but lacked the motivation to prioritize them and follow through with these self-care behaviors. Throughout the interviews, participants knew what they needed to do to take care of themselves, but the execution of these behaviors is not consistent. Some patients, such as Teddy, admitted the lack of implementing health behaviors and identified a need to change their exercise patterns specifically related to taking better care of themselves.

Now, I'm short-winded. I can't do all that no more. I'm 53 years old. I should at least be

able to walk around the house, walk my dog. You know, I can't even jog.

Exercise. Cause I haven't been doing a lot exercising. I sit around, I smoke cigarettes.

I got to get out, man. I got to get out. Exercise. You know, not go run up and down the

street like I'm 15 years old but taking a little bit more pride in my health. (Teddy)

Other patients showed a lack of prioritizing healthy diet choices such as Antonio when

asked what he can do to prevent coming back in, Antonio stated, "Um…staying away from

sweets, sodas… stay hydrated when you go outside." This shows the knowledge of proper self-

care behaviors, but also that there is a disconnect between doing the right thing and doing what

you want.

Two self-care behaviors specifically related to diabetes management would be checking

blood glucose levels and administering insulin to keep the blood sugars in line. Lynn stated

"…Like beforehand, I didn't really care [about taking insulin] but now…" This statement also

shows the knowledge to take insulin properly but the poor prioritization of this self-care behavior

for this diabetic patient that led to readmission. Teddy shows the same lack of prioritization with

checking his blood glucose levels when he stated "Sometimes I might not check it but one time

that day..." Most of these patients knew the proper actions to take to manage their diabetes but

lacked initiative in prioritizing self-care behaviors.

Social Support Reliance

Most patients in this study relied on support from family and to manage their diabetes

and promote health. When these patients had a lack of support, their ability to manage diabetes

was diminished. Vonni stressed the importance of social support in the management of diabetes.

But the one thing that we all need as human beings is some kind of a support system from

somebody else that says "A, I believe in you" or "A, you doing a good job" or "A, you

doing alright" or "Go ahead. Keep pushing".

On the other hand, multiple participants expressed a lack of support in managing their

diabetes. Participants such as Lynn showed a lack of support and encouragement from support

persons when they stated, "my husband, he just fuss at me all the time…when I get off from

work, I would just come home and go to sleep." This lack of social support can decrease morale

and motivation to take care of themselves and their diabetes.

Another barrier to social support would be a lack of knowledge in social support persons

about the disease process. Antonio said their family did not exactly understand the difference

between type I and type II diabetes and how the disease management was different. The social

support was only familiar with type II diabetes and did not understand the reliance upon insulin

and checking blood glucose levels frequently. The lack of knowledge or lack of encouragement

of support persons is balanced with the need for and importance of social support in the

management of diabetes and can lead to patients readmitting into the hospital with DKA.

Financial Unpredictability

Job stability, housing and debt lead to financial instability and a decreased ability to

manage their health. With 75% of this population making less than $10,000 annually and 50% of

them not working due to their disability, majority of this patient population has a lack of

sufficient income. This presents a major barrier because these patients need insulin to stay alive

but lack the financial resources to fund this medication. The presence of a job makes a

significant impact on the management of diabetes. Many patients are unable to keep a job due to

the unpredictability of their disease and the amount of care that it requires. When asked if the

patient worked, Antonio stated, "Unh uh. Not a one. It [Diabetes] took me out." Other patients, such as Vonni, communicated the difficulty in finding a job that is suitable to them in their current state of health.

> Yeah, because I have been trying to work with [Employement Firm]and being a flagger, but due to my health I'm not able to withstand the weather that long and that was like the only little way of making money I had.

Other patients found themselves in debt and unable to pay for their insulin. Teddy expresses his concerns by stating:

> All of it changed. Because financially, I found myself falling further and further in the hole of debt. See, my medication I got to pay for. But I don't pay for it, I don't get it. And that's kind of nuts, but that's the way it roll. At one time I had like a co-pay, $3. Now I have to pay the full-price for my insulin, for my pills in order to keep my hind part alive

One patient, Vonni, found themselves homeless and living in shelters because of the financial burden that this disease has. Other patients have been homeless in the past because of the financial instability that they experience. Finances have a huge impact on the ability to have stable housing, much less for these patients to have a job or pay for the medicine they need to properly manage their disease process.

Hospitalization Hope

During and immediately after hospitalization, most patients have a surge of knowledge with their exercise, diet, and health knowledge. This theme stems from patient responses that they will take better care of themselves after they get out of the hospital. Teddy shows this hope

that once he leaves the hospital, he will be able to take better care of himself to prevent himself from readmitting into the hospital with DKA.

> So, if I can fight this, I know I can fight diabetes again cause I'm not giving up.

> I have to do better by my standpoint, by my health…You know, I'm trying to get my life back together, man, where it should be. I can't keep doing the same thing the rest of my life and expect to continue to have a good health unless I change my life. So, I have to change my life

This hope stems from the shock of this hospitalization and the drive to rise up from rock bottom and make a big change in their lives. Another participant, Lynn shows a different version of this hope where she states, "I have everything I need; I just got to get it up here in my head and do it." This shows the knowledge they have about managing their disease and also the hope that she will make the changes necessary in order to take better care of herself. The hope that patients receive during their hospitalization is balanced only slightly with the other barriers to their health.

Discussion

This secondary descriptive qualitative analysis study about the contributors to DKA readmission from a SDOH lens resulted in the identification of a number of social determinants that contribute to DKA readmissions. Many factors, such as self-care behaviors, social support, and finances, impact a patient's propensity to readmit with DKA. These results show how much of an impact the social determinants of health can have on a patient and the management of their disease. The financial instability seems to be the biggest deterrent for this population to manage their disease appropriately due to the fact that the medicine keeping them alive is expensive. Finance, a social determinant of health, can have a direct impact on glycemic control as

supported by Bradford, Crider, Xu, and Naqvi (2017). The next critical factor would be the poor

self-care prioritization that prevents people from managing their diabetes efficiently. Walker,

Gebregziabher, Martin-Harris, and Egede (2014) show that self-efficacy and perceived stress

effect self-care. The last factor that impacts patient's risk for readmission is social support as

supported by Smalls, Gregory, Zoller, and Egede (2014) who found that access to healthy foods

and social support latent variables had significant associations with type II diabetes self-care

behaviors. This aspect of patient's lives can be crucial in preventing patients to readmit into the

hospital for DKA by having someone to believe in the patient or just simply communicate with

them.

The hope they receive during a hospitalization balances, only slightly, the risk for

readmitting in the future. This optimism that the participants feel can be correlated to the severity

of the condition that patient present with, diabetic ketoacidosis and the impact this

hospitalization has upon the patient. One study even found a correlation between hope in type 1

diabetics and a more controlled HbA1c (Van Allen et al., 2015). While this hope can have great

benefits to these patients, the other contextual life factors often times outweigh the hope, leading

this population to readmit again with DKA. On a daily basis, the participants must balance the

negative financial and social factors against the positive hope they receive. All of these patients

were interviewed during or near an admission to the hospital and they all exhibited hope that this

time would be different.

Recommendations

Understanding the social determinants that lead to readmissions informs the development

of interventions to improve the health of patients with diabetes, reduces readmission rates, and

decreases the cost burden for patients and healthcare organizations. Implications for practice may

include education development and counseling sessions to assist patients with identifying

support systems to mitigate these social contributors to their readmissions. Healthcare

professionals can assist patients with identifying support systems that will facilitate alterations in

health maintenance behaviors that may also prevent repeated readmission. Case management

during their hospital stay could address the financial instability by setting them up with resources

for jobs or housing. Case management could also address the social support reliance by setting

patients up with social support groups or designating a specific support person. Case

management takes advantage of the hope that patients have during their hospitalization so that

patients are inspired to utilize the resources provided after their discharge. Nurses can also

provide detailed discharge teaching related to diabetes management in order to lower this

populations risk for readmission. A multitude of interventions exist to better prepare this patient

population from readmitting frequently for DKA

Limitations

Though careful considerations went into the study design, a few limitations are worth

noting. First, this study was a secondary analysis with data gathered from a parent study who

asked interview questions tailored to their study. Second, this study was conducted at one

southeastern medical center which limits the breadth of this patient population to one region.

Third, this sample lacked diversity and population representation as the sample belongs to one

demographic. The study could have benefitted from having a better representation of the

population to gain a better understanding of the responses within demographics. Finaly, the

sample consisted of four interviews which limits the variety of patient responses. Researchers

and health care workers could have benefitted from more interviews, and interview questions

specific to SDoH impacting this patient population. However, the themes gained from this in-depth analysis of a small sample allowed for a more focused interpretation of the interviews.

Conclusion

Diabetes Mellitus is an expansive disease process that impacts many individuals across the world and the factors in their lives can be critical in the state of their disease. Specifically, social determinants of health can make an immense impact on the health of patients who readmit with DKA frequently. Poor self-care prioritization, social support reliance, and financial unpredictability were the main contributors that led to these diabetic patients readmitting into the hospital for Diabetic Ketoacidosis. These patients present with a deficit in these areas that lead to their readmission and interventions are necessary to better the health of this population. The recognition of these factors can lead case managers, nurses and other members of the health care team to assist these individuals so that they can reduce the number of hospital admissions for DKA. The more we can help empower and prepare this population to take control of their diabetes, the more we can prevent recurrent DKA events.

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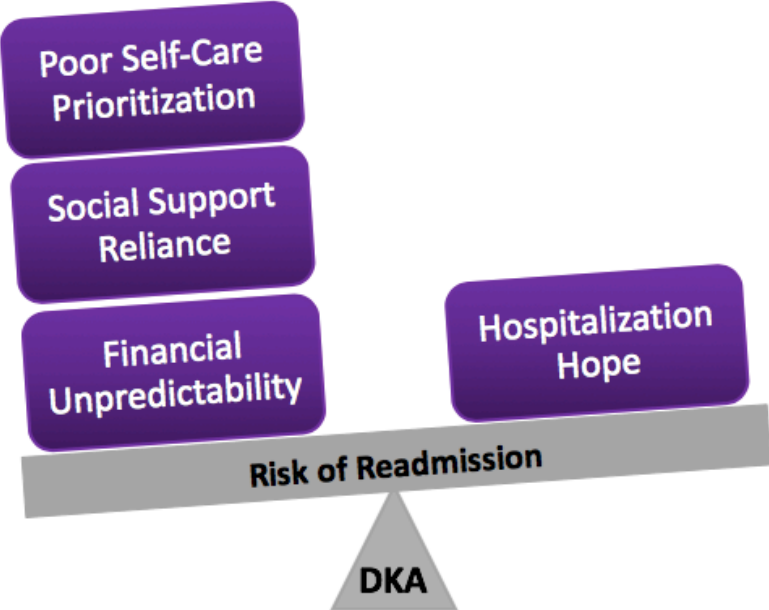
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Figure 1: Balancing the Risk for DKA Readmission