Type 2 Diabetes: An Overview of Nursing Care

Alana B. Snyder

California State University, Chico

Type 2 Diabetes: An Overview of Nursing Care

According to the Center for Disease Control & Prevention (2011), diabetes is the sixth most common cause of death in adults in the United States, 25.8 million people in the United States have diabetes, and 90 to 95% of adults with diabetes suffer from Type 2 Diabetes. Diabetes is a major cause of heart disease, stroke, and complications such as hypertension, blindness, kidney disease, non-traumatic amputations, and nervous system damage (CDC, 2011). Total estimated medical care costs for diabetes in the US are astronomical, and the number is only expected to rise, to as much as $192 billion by 2020 (CDC, 2011). Rising healthcare costs, an aging population, and other prevalent risk factors like obesity are predictors of the continued rise in diabetes (Smeltzer, Bare, Hinkle, & Cheever, 2008). People with diabetes pay, on average, twice that of non-diabetics in medical expenses. According to Smeltzer et al. (2008), half of all people with diabetes undergo hospitalization every year. Research shows that Type 2 Diabetes can be prevented largely by lifestyle modifications such as weight loss and exercise (Smeltzer et al., 2008). Educational intervention by nurses plays a vital role in the care for this population.

Pathophysiology

Diabetes is a chronic metabolic disease characterized by high levels of glucose in the blood, termed hyperglycemia. Glucose is needed by human cells for energy. Insulin is an endocrine hormone produced by the beta cells of the pancreas. Insulin transports glucose into muscle, liver, and fat cells to use for energy, stimulates storage of glycogen in the liver and muscles, inhibits the breakdown of stored glucose, protein, and fat, and signals the liver to stop the release of glucose (Smeltzer et al., 2008). Insulin is responsible for the management of blood

sugar. If the glucose in the blood stream cannot be taken into cells, it remains in the blood (hyperglycemia) and causes many complications and health risks. Furthermore, if the body cells do not have enough glucose to use for fuel, they may begin to use muscle and fat, producing ketones bodies - acids that can cause Diabetic Ketoacidosis, a life threatening emergency. This is less common in Type 2 Diabetics than in those with Type 1, as there is usually enough insulin circulating to prevent fat breakdown (Urden, Stacy, & Lough, 2010).

Type 2 Diabetes, formerly called "non insulin-dependent diabetes," involves a defect in the way one's body makes or uses insulin. In this form of diabetes, people may still able to make and secrete some insulin, unlike those with Type 1 Diabetes who have absolute insulin deficiency because of destroyed beta cells in the pancreas (Urden et al., 2010). Urden et al. (2010, p. 900) explain the problem lies in a "progressive insulin secretory defect in addition to insulin resistance." *Insulin resistance* occurs when the body's organ and tissue cells do not allow glucose and insulin to enter, leaving high levels of insulin (that cannot do its purpose) and glucose in the blood circulating. The patient may be producing adequate, or even an overproduction of, insulin in the beta cells, yet it cannot be used. Insulin resistance has been shown to increase with obesity. In others with Type 2 Diabetes, there is what is called *inadequate insulin response* in that the beta cells may not be functioning efficiently or declining in productivity and an inadequate amount of insulin is produced (Urden et al., 2010). The effect is too much glucose in the bloodstream. If allowed to continue for years, the toxic effects of glucose derivatives on body tissue are the primary cause of late complications of diabetes (Solnica, 2006). Chronic complications of diabetes are: high blood pressure and heart problems leading to heart attacks and heart failure; difficulty in vision and retinal damage leading to

blindness; compromised renal perfusion, leading to kidney failure; nerve damage primarily leading to problems of the lower extremities but also other parts of the body (Kapur & Kelkar, 2012).

Symptoms and Risk Factors

Type 2 Diabetes is associated with insidious symptoms that may take years to become noticeable. Increased urination and thirst are classical signs of Type 2 Diabetes. Mild fatigue, polyuria, polydipsia, poor wound healing, blurred vision, and vaginal infections may also be other symptoms (Smeltzer et al., 2008). A fasting plasma glucose greater or equal to 126 mg/dL, confirmed with two tests, OR symptoms of diabetes and a random plasma glucose equal or greater than 200 mg/dL is criteria for diagnosis (Smeltzer et al., 2008). Risk factors for developing type 2 diabetes include family history, obesity (increases insulin resistance), older age >45 years (age-related changes in carbohydrate metabolism), history of hypertension, previous gestational diabetes, and low HDL cholesterol level (Smeltzer et al., 2008).

Treatment

Treatment is largely aimed at maintaining blood glucose levels in the normal range. According to Smeltzer et al. (2008), the five components of diabetes management are: Nutrition Therapy, Education, Monitoring, Exercise, and Pharmacologic Therapy. The first step for those diagnosed with Type 2 Diabetes is usually diet modification and weight loss (Smeltzer et al., 2008). Exercise is useful in maintaining blood glucose by promoting the effect of insulin (Smeltzer et al., 2008). If hyperglycemia persists with these interventions, oral anti-diabetic agents can be used. There are many different antidiabetic oral drugs and often a combination of more than one is used (Urden et al., 2010). During times of illness or lack of success with oral

antidiabetics, subcutaneous insulin injections may be necessary due to the physiologic stress or unstable blood glucose levels (Smeltzer et al., 2008).

Nursing Interventions

The nurse has a major role in diabetes prevention, care, and management. Teaching is an integral nursing intervention for those with Type 2 Diabetes. The goal of diabetes treatment is maintaining blood glucose levels at a steady, normalized rate, thereby preventing complications such as retinopathy, neuropathy, and nephropathy (Smeltzer et al, 2008). Prevention of Type 2 Diabetes is attainable, and nurses can help patients at risk for developing diabetes by teaching lifestyle modifications. Regular exercise and weight loss for those who are overweight are the recommendations by the American Diabetes Association (2012). Often, newly diagnosed patients can avoid taking medications or insulin by simply changing their diet, losing weight, and exercising (Smeltzer et al., 2008). This may be a hurdle to many patients who do not have adequate nutritional education or who are psychologically adverse to changing their diet or lifestyle; nurses can help identify these issues and problem solve.

The first thing the nurse should do with a newly diagnosed patient is assess. With a thorough assessment, the nurse can then plan interventions with the specific patient in mind. The nurse should assess learning needs, ask the patient and family what their concerns are, address fears, reiterate that feelings of shock and depression are normal at this time (Smeltzer et al., 2008). Patients may fear self-injection, but this task must be accomplished if the patient is going to need insulin in the home environment. The insulin protocol must be very clear, and patients can eventually learn to adjust insulin to their blood glucose readings over time.

A major nursing intervention for the patient with Type 2 Diabetes is educating the patient and helping he or she develop self care management and skills. All patient teaching must be adapted to the individual, taking into consideration the progression of the disease, and any comorbidities. Teaching the newly diagnosed patient can be divided into two phases: basic/ initial information, and advanced/ continuing education (Smeltzer et al., 2008). The initial teaching includes the information the patient NEEDS to know to survive and is imperative for safety. The patient must know the basics, and have a knowledge base and understanding of the diabetic disease process. This includes the basic pathophysiology of diabetes, different treatment modalities, recognition and prevention of hypoglycemia and hyperglycemia complications, when to contact physician and where to buy and store supplies (Smeltzer et al., 2008). When the patient becomes more comfortable and accepting of the diabetes diagnosis, more in-depth teaching can occur.

Self-monitoring of blood glucose levels is an extremely important step to attaining normalized levels and preventing complications of diabetes. The patient must also understand what increases and decreases the need for insulin, signs and symptoms of hypoglycemia and hyperglycemia, and proper foot, skin, and blood pressure care. The patient is taught about supplies, medications, self blood glucose monitoring, any special assistive devices needed, community resources and education tools. Also important are instructions regarding eye care, skin care, infection control, and general hygiene with an acknowledgment of understanding by the patient. The more the patient understands, the better he or she will be able to independently manage his or her health.

For the hospitalized patient with newly diagnosed Type 2 Diabetes, the nurse maintains fluid and electrolyte balance, administering any IV fluids and electrolytes, measuring intake and output, assessing for signs and symptoms of dehydration. She monitors vital signs, lab values, edema, and cardiac status (Smeltzer et al., 2008). Control of blood glucose in the inpatient situation is extremely important to facilitate healing and prevent complications. One life-threatening complication of Type 2 Diabetes is Hyperglycemic Hyperosmolar State (HHS). Patients will have an extremely high blood glucose level (>600), leading to hyperosmolality, and resulting in osmotic diuresis. This produces profound dehydration, changes in level of consciousness, possible hypovolemic shock, and eventually coma if interventions do not occur. HHS can be hard to detect in diabetic patients because of its subtle onset, but nurses should watch for vision changes, weakness, weight loss, and polyuria in patients at risk. Nursing interventions include: administering the prescribed intravenous rehydration (large volume), insulin drip, supplemental potassium, monitoring BP, CVP, and HR in response to therapy, and watching for complications (Urden et al., 2010).

For the nurse working in the hospital, many patients will have Type 2 Diabetes as a comorbidity of the primary diagnosis for their hospitalization. Many patients in the hospital may have unrecognized diabetes. A fasting blood glucose of 126 mg/dL or a random level of 200 mg/dL can be classified as diabetes and later confirmed following discharge. Nurses can identify patients with previously unrecognized diabetes and intervene to achieve normalized levels. Research has shown that nurse-driven protocols of titrating insulin in the hospital and close monitoring of blood glucose levels dramatically improves patient glycemic control and outcomes (Lange, 2010). Due to the adverse effects of hyperglycemia on healing and wellness, it is vital

for every nurse to have diabetes knowledge and use the nursing process in the care of patients.

The nurse should focus on nutritional intake and diet teaching, with the overall goal of maintaining glucose at an acceptable level. After assessment of the patient's diet, food preferences, weight and BMI, activity level, the nurse works with a dietician and diabetes educator to develop a plan of care for the diet. The nurse also manages insulin administration and coordination with food intake and blood glucose levels. The nurse explains the need for the prescribed diet and works in conjunction with the registered dietician. The recommended diet for Type 2 Diabetics is consistent, decreased quantities of carbohydrates and increased vegetables, fruits, and whole grains (Urden et al., 2010).

The nurse needs to attend to the psychological needs of the newly diagnosed Type 2 Diabetics as well. Providing emotional support and listening to the patient, answering questions and working to reduce anxiety, can all help the patient work through the grief process due to loss of health. The nurse should encourage the patient and family to take an active part in care and perform the tasks they will need to accomplish at home. This empowers the patient to manage his or her care confidently.

Case Study

J.B., a 50 year old male, comes into the clinic for a checkup after taking a family trip across the country. His wife noticed they would have to stop almost every hour for J.B to use the restroom and purchase a sugary soda. He was consuming up to three 2-liters of soda throughout a day, and remarked about how hungry he had been lately. J.B is found to have a random blood glucose level of 270 mg/dL and 135 mg/dL on a later fasting blood glucose test. These results along with the classic symptoms of polydipsia, polyphagia, and polyuria J.B. has been

experiencing are enough to diagnose him with Type 2 Diabetes. His history includes lifelong obesity, with a BMI of 34. J.B. works 50 hours or more a week in a sedentary occupation. J.B has no medical background, and hasn't been to the doctor for a checkup in six years. His main concern is, "Do I have to give myself shots forever now?"

The nurse completes the doctor's orders of obtaining vital signs, weight, ordering labs for lipids and electrolytes, and other markers for complications of diabetes. The nurse begins the assessment by asking the client what his specific fears are concerning his diagnosis, and takes time to listen and answer any questions to decrease J.B.'s anxiety. The nurse explains that Type 2 Diabetes can often be managed by lifestyle modifications in diet and exercise, and does not necessarily mean that he will need to self inject insulin forever or even at all. She explains there are many oral antidiabetic agents that are now used if weight loss and activity alone do not help lower blood glucose levels. The nurse provides literature about diabetes, so that J.B. can take them home and read them when he has more time and is less emotionally overwhelmed. The nurse explains the basic pathophysiology of Type 2 Diabetes, what it means, how insulin and blood sugar are related, and the symptoms of the disease. The nurse marks the spots in the literature handouts referring to her verbal instructions for J.B. to study later. J.B. expresses understanding of the basic diabetes regime instructions.

The nurse does a full assessment of the patient, paying special attention to the neurovascular, cardiac, and renal systems, as those are often affected by diabetes. The nurse checks the skin of the lower extremities, palpating pulses and checking capillary refill for blood flow, as poor blood flow in the extremities can occur in diabetes and will increase the risk for slow wound healing and ultimately put the patient at risk for amputation. J.B is found to have

diminished sensation in his feet, a sign of a common complication, peripheral neuropathy. The nurse instructs J.B. to check his feet daily and avoid any breaks in the skin which can become a gateway for pathogens, leading to infection. The nurse stresses to J.B that he needs to employ proper hygiene measures like hand-washing. He should take care to avoid an infection which J.B. would have more difficulty overcoming because of decreased circulation, oxygen, and high blood glucose. J.B. is given an appointment for an eye exam, as retinopathy is a complication of diabetes and he mentions that he sometimes has blurred vision. The nurse ensures J.B. understands he needs to have all lab tests for renal function done per his physician recommendation.

After the physical and learning needs assessment, the nurse prepares to provide initial, "survival" skills for J.B. to take home. The nurse instructs him in use of the blood glucose meter, and has him give a return demonstration. She tells him when he should test his blood glucose, as prescribed by his doctor; either daily, every morning/ night, with meals, etc. The nurse explains the parameters for the insulin dosages, and fully explains all equipment - syringes, insulin bottles and storage of those when open, sites of injection, and demonstrates drawing up the insulin and has J.B. return demonstration. The nurse allows J.B to practice on an object, and instructs on the importance of rotating sites. She also gives him written instruction for further clarification. The nurse tells J.B. to record his blood glucose levels in a log, and to notify the doctor if he gets a reading above 300 mg/dL or below 60 mg/dL, or per MD orders. She instructs in the signs and symptoms of hypoglycemia and treatment, actions to take if unable to eat due to sickness, how to take oral antidiabetics, and signs of complications.

Discharge/Planning Patient/ Family

Luckily, J.B. came into the clinic before he needed to be hospitalized for his Type 2 diabetes or complications. The nurse at the clinic continues with the nursing process in planning care for J.B. before he is sent home to be cared for on an outpatient basis, involving his wife as a back up caregiver as well. The nurse identifies these goals:

(1) Blood glucose level will be within a desired range within two weeks.
(2) J.B. and caregiver will verbalize knowledge of basics of dietary regime by end of clinic visit.
(3) J.B. and caregiver will verbalize understanding of complications & preventative measures by followup visit in one week.
(4) J.B will be competent, evidenced by return demonstration and verbalization, in med administration and glucose monitor within one week/ time of next appointment.
(5) J.B. will verbalize understanding of lower extremity care within one week.

J.B. is in need of special resources such as a diabetes educator, a dietician, a physical therapist, and chooses to join a Diabetes and weight loss support group. He is also given a list of online and community resources, where he can obtain more information and support.

A week later, at his follow up visit, the nurse assesses his vitals, blood glucose, and asks him how he is doing. J.B. replies, "I am learning as much as I can about the management of Diabetes. It is hard for me to change my diet but I am determined to lose weight and not have to use insulin injections or antidiabetic pills." He reports that he has increased his intake of vegetables and decreased simple carbohydrates and completely stopped drinking soda. His wife is supporting him and following the diet herself. J.B has a random blood glucose reading of 120 mg/dL, 1.5 hours after breakfast, and his log shows random readings from 140-195mg/dL. J.B

has lost five pounds in one week, and states he is meeting with a physical therapist and walking for fifteen minutes a day. The nurse praises him on the lifestyle changes he has made, noting he seems very motivated. She answers any questions he has, and instructs him about the importance of adherence and consequences of noncompliance in diabetic management. J.B. has met the goals (2), (3), (4), (5), and needs more time to fulfill (1). J.B. states he now wears slippers in the home, and washes his feet everyday, examining his lower extremity skin for breaks.

A few months later, J.B. gets an unnoticed scratch on his foot from a new kitten. A large, painful lump soon forms on his foot, oozing purulent drainage and interfering with walking. J.B. ends up in the hospital with an abscess in his foot that requires surgical incision and debridement, and IV antibiotics. After 6 days, J.B. is going to be discharged home and the nurse is planning his care. In talking with him while recovering, the nurse learns that J.B. has had to travel often for work lately, is under stress, and has "slipped a little" with his meal plan. He states his blood glucose readings have been always under 300 mg/dL, so he never notified his physician. He can count five times in the weeks prior when his reading was above 260 mg/dL. J.B. explains that although he has lost a total of twenty-five pounds, he is still having trouble with meal planning. The nurse decides to suggest he and his wife attend another session with a dietician. The nurse asks if there is anything else he is having concerns about and he relates that he feels overwhelmed with his diabetes management and that he "still doesn't know enough." The nurse decides that J.B. should be referred to home care when he returns home, so that he can be monitored and assessed in the home environment, and given more instruction on the disease process of Type 2 Diabetes. The nurse also instructs J.B. about foot care and hygiene, stressing

again the importance of monitoring for lower extremity lesions. The nurse instructs about the effects of stress on glucose and teaches him some simple stress management skills such as mindful deep breathing, journal writing, daily walking, and supportive relationships. The nurse also determines that the wife needs support and offers her information about a Diabetes caregiver support group. Lastly, the nurse stresses that he must follow up with his physician for all appointments and follow medication regime to decrease exacerbations.

Cultural & Spiritual Considerations

It is always important to take into account the specific ethnic background of the patient when a nurse is planning care. The nurse needs to assess cultural and spiritual beliefs and develop goals and interventions that respect those preferences or customs. For Type 2 Diabetes, the preference or cultural food choices is very important. Diet and glucose control are very closely related and the nurse needs to know what the patient typically eats. Also for diabetes, some patients of different cultures view disease differently. Some may not want to take medications or injections for cultural or spiritual reasons. Others may have specific rituals, beliefs, or family roles that can change the way healthcare is delivered.

For example, for the Hispanic culture, which incidentally have a higher rate of Type 2 Diabetes than caucasians: According to Parada, Horton, Cherrington, Ibarra, & Ayala (2012):

> In the United States, the incidence of diabetes in adults aged 18 to 79 has almost doubled in the past decade. While rates have increased in the general population, the prevalence remains unevenly distributed, with 11.8% of Hispanics, 12.6% of non-Hispanic blacks, and 8.4% of Asian Americans diagnosed with diabetes compared to 7.1% of non-Hispanic whites. (p. 553)

Furthermore, the authors assert that Latinos have less blood glucose control than other ethnic groups, for these reasons: language and cultural barriers to health information, lack of access to health care, and sociocultural barriers to adherence with treatment and diabetes management. The study found that noncompliance in the Latino population is associated with being male, having depression, and engaging in less "personal actions." The most common reason given for non-adherence was forgetting to take the prescribed oral medication. The nurse can address this issue by instructing the client to link taking the diabetes medication to daily events, with the use of email or note reminders, or dosing cups (Parada et al., 2012).

According to Silvestri (2011), patients of Hispanic origins tend to be verbally expressive, may avoid eye contact out of respect, and tend to use gestures or facial expressions to show pain and emotions. The importance of extended family and the Catholic religion are also common considerations. A barrier to effective communication might be language, as Spanish is usually their primary language, and if there is a possibility of any misunderstanding on either side, an interpreter should be used. Written educational literature in the primary language of the patient should be provided. Some folk beliefs related to health may be present depending on the age and cultural orientation of the patient. It is important that the nurse understands different beliefs and that some patients may believe health to be connected to a reward or punishment from God (Silvestri, 2011). Some older Mexican patients may believe that diabetes is related to "nerves" or emotional stress, and some may wish to practice folk remedies for their illness (Palmquist, A., Wilkinson, A., Sandoval, J. M., & Koehly, L., 2012). It is important to evaluate these remedies with the current medical treatment plan and instruct as appropriate.

Mexican Americans are almost twice as likely as non-Hispanic whites to be diagnosed with Type 2 Diabetes (Health Education Research Advance, 2012). It is imperative to stress diet and exercise as effective means of controlling blood glucose. Another barrier often seen in this cultural group is medication costs and lack of health insurance in this country. Ngo-Metzger, Sorkin, Billimek, Greenfield, & Kaplan (2012) assert, "Mexican-American patients reported having more financial barriers to receiving medical care, more perceived financial burden related to their diabetes, and more cost-related medication non-adherence, compared to Vietnamese and non-Hispanic white patients (p. 436)." Nurses as care providers should initiate a conversation with patients about medical costs and financial pressures. Strategies to reduce medication costs should be looked into and options for affordable medications, possibly by involving an MSW in patient care.

Conclusions

In conclusion, Type 2 Diabetes is a national and global health issue and affects all cultures. With high rates of obesity in the United States, an aging population, and high healthcare costs, Type 2 Diabetes is a disease we need to fight. Nurses can play a tremendous role in determining a positive outcome of patients through interventions and education. Nurses can make a huge difference in the life of every diabetic patient through using evidenced-based practice and individualized teaching centered on the common goal of health.

Possible Nursing Diagnoses	Collaborative Interventions	Independent Interventions
Knowledge Deficit	Diabetes educators, MD	Instructive literature, verbal teaching, demonstrations
Imbalanced Nutrition: more than body requirements	RD/ nutrition work with patient to form a meal plan	Patient teaching about appropriate diet balance
Risk for Ineffective Tissue Perfusion	Wound care nurses if wounds present	Monitor peripheral pulses, color, temp, oxygen sat
Risk for Impaired Skin Integrity	DME vendors, work with ancillary staff to turn patient and bathe	Monitor skin, turn pt, ensure nutrition, assess skin
Risk for Infection	Administer prescribed antimicrobials	Ensure nutrition, hygiene measures, hand washing, monitor vital signs for s/s of infection
Ineffective Health Maintenance	Enlist interventions of PCP, educators, mental health	Assess reasons for inability to maintain health
Anxiety	MSW, PT, mental health providers, MD	Empathetic listening, instruction in nonpharm. stress relief
Fluid Volume Deficit	Administer prescribed fluids, monitor BG and keep within normal range with insulin as prescribed	Monitor intake & output, watch for signs of dehydration, monitor labs and electrolytes
Activity Intolerance	PT to develop exercise routine MD to ok patient for exercise	Teach activities that can perform at their level, regular walking is an appropriate beginning
Risk for Unstable BG	Diabetic educators	Instruct in regular log-keeping and evaluation by RN

References

Kapur, A., & Kalkar, S. (2012) Diabetes and its complications. *World Diabetes Foundation*. Retrieved from http://www.worlddiabetesfoundation.org/composite-218.htm

Lange, V. (2010). Successful management of in-hospital hyperglycemia: the pivotal role of nurses in facilitating effective insulin use. *MEDSURG Nursing*, *19*(6), 323-328.

National diabetes fact sheet (2011) *Centers for Disease Control and Prevention*. Atlanta, GA: U.S. Department of Health and Human Services. Retrieved from http:// www.cdc.gov/diabetes/pubs/factsheet11.htm

Ngo-Metzger, Q., Sorkin, D.H., Billimek, J., Greenfield, S., & Kaplan, S.H. (2012). The effects of financial pressures on adherence and glucose control among racial/ ethnicially diverse patients with diabetes. *JGIM: Journal of General Internal Medicine*, 27(4), 432-437. DOI: 10.1007/s11606-011-1910-7

Palmquist, A., Wilkinson, A., Sandoval, J. M., & Koehly, L. (2012). Age-related differences in biomedical and folk beliefs as causes for diabetes and heart disease among mexican origin adults. *Journal of Immigrant & Minority Health*, *14*(4), 596-601. DOI 10.1007/ s10903-011-9522-1

Parada, H., Horton, L., Cherrington, A., Ibarra, L., & Guadalupe, A. (2012) Correlates of medication nonadherence among latinos with type 2 diabetes. *The Diabetes Educator,* 38: 552-561. DOI:10.1177/0145721712445215.

Silvestri, L.A. (2011) *Saunders comprehensive review for the NCLEX-RN examination* (5th ed.). St. Louis, MO: Elsevier.

Smeltzer, S. C., Bare, B. G., Hinkle, J.L., & Cheever, K.H. (2008) *Brunner & suddarth's textbook of medical-surgical nursing (*11th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Solnica, B. (2006). Molecular mechanisms of the damaging effect of glucose on tissues. *Experimental & Clinical Diabetology*, *6*(5), 227-234.

Urden, L.D., Stacy, K.M., & Lough, M.E. (2010) *Critical care nursing: Diagnosis and management* (6th ed.). St. Louis, MO: Mosby.