DIABETES: OPTIONS FOR A HEALTHY LIFESTYLE

DIABETES SERIES: PART IV

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ABSTRACT

Current research has improved the medical knowledge and management of diabetes. Knowledge of the main and less common forms of diabetes mellitus, including associated risk factors, laboratory testing and screening, and diabetic treatment are necessary for clinicians to develop a comprehensive and thoughtful plan of patient care. The basics of insulin secretion and metabolism, medical management of insufficient insulin as well as lifestyle and prevention of diabetes are discussed.

Policy Statement

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This educational activity is credited for 3 hours. Nurses may only claim credit commensurate with the credit awarded for completion of this course activity.

Statement of Learning Need

Health clinicians support patients that have diabetes to understand the nature and treatment of their disease. Knowledge of the current trends in diabetes research and medical management is important for clinicians to provide safe and appropriate communication, interventions and advocacy for the diabetic patient and their family. Educating diabetic individuals about the type of diet they should maintain as well as other lifestyle choices is integral to diabetic health and wellness.

Course Purpose

To provide health clinicians with knowledge of the main types of diabetes mellitus as well as the less common types in order to educate patients, families and peers about the right diabetic treatment and health choices.

Target Audience

Advanced Practice Registered Nurses and Registered Nurses

(Interdisciplinary Health Team Members, including Vocational Nurses and Medical Assistants may obtain a *Certificate of Completion*)

Course Author & Planning Team Conflict of Interest Disclosures

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Acknowledgement of Commercial Support

There is no commercial support for this course.

Please take time to complete a self-assessment of knowledge, on page 4, sample questions *before* reading the article.

Opportunity to complete a self-assessment of knowledge learned will be provided at the end of the course.

1. **Blood Pressure is defined as**

    a. the pressure of blood in arteries.
    b. amount of blood pumped to the heart.
    c. the pressure of blood in the organs.
    d. pressure of blood in the liver.

2. **What effect does nicotine that is in cigarettes have on the blood vessels?**

    a. No effect
    b. It hardens and narrows blood vessels
    c. It widens blood vessels
    d. It causes them to soften

3. **The blood glucose level before it is safe to exercise is**

    a. lower than 100mg/dl.
    b. 250 mg/dl and above.
    c. 100-250mg/dl.
    d. 300mg/dl.

4. **In pancreatic transplant procedures, a healthy pancreas is obtained from**

    a. a brain dead donor who is still on life support.
    b. a deceased person.
    c. a pancreatectomy performed within the past 20 hours.
    d. the patient's closest living relative.

5. **Gastric bypass surgery alters the process of _____.**

    a. reproduction
    b. digestion
    c. metabolism
    d. respiration

Introduction

By making changes to their daily diet and lifestyle routine, patients with diabetes mellitus may be able to improve their overall health. These changes may include lowering the blood sugar level as well as reducing the risks of stroke and heart attack.[1] Prior diabetes studies have raised the benefit of motivational interviewing in the primary care setting as a method to improve patient compliance with diabetes treatment as well as disease outcomes. Motivational interviewing is a way for health team members to take the patient's perspective into account and to encourage collaboration and partnership when planning diabetic care. This course focuses specifically on current recommended treatment and motivational techniques used by primary care clinicians to promote improvement in diabetic care through patient education and participation in treatment plan goals on wellness.

Healthy Body Weight, Diet and Exercise

A large number of patients with diabetes mellitus type II are overweight. Losing extra pounds and working to maintain weight loss will aid in controlling the blood sugar as well as to improve the patient's overall sense of wellness. This section provides an overview of current health recommendations clinicians might raise when educating their diabetic patients.[1-6,8-10]

In order to embark on the mission of weight loss, a patient should first determine the amount of weight they need to lose. Body mass index (BMI) is a measurement that is used to calculate body fat. An individual's BMI is calculated based on height and weight. A healthy BMI is less than 25 and a patient should be advised to lose weight if the BMI is found to be above 25. A reasonable goal to set is 7% of the current weight. It is however beneficial to a patient's health if the patient is able to lose any weight at all.

Guiding the patient on a weight loss program will improve the overall health of the patient regardless of how much weight is lost. Continuous encouragement from primary care clinicians and family members will allow the patient to feel motivated even when weight loss is not obvious. A healthy diet in combination with exercise is one of the best ways for a patient to lose weight and to keep it off.

Healthy Body Weight

It is commonly observed that newly diagnosed patients with diabetes mellitus type II are overweight. The excess in weight, particularly in the abdominal area makes it hard for cells to react to insulin. This will result in high glucose. It has also been observed that a decrease in weight and increase in physical activity is essential in lowering blood glucose levels for patients with diabetes mellitus type II. By losing weight, a patient is lowering the risk of developing other health complications such as cardiovascular disease that pose a threat to diabetic patients.

In the western world, there is a high rate in individuals who are overweight and obese. Having too much body fat especially in the region of the waist will increase the risk of developing diabetes mellitus type II in conjunction with cancer and heart disease.

Determining Healthy Body Weight

There are a few ways to determine if a patient has a healthy body weight. This may include taking a measurement of the waistline as well as measuring the BMI.

An increase in the waistline may act as a good indication of the risk of developing serious chronic health conditions. This may be due to the fact

that carrying excess fat in the abdominal area is more dangerous than having fat anywhere else on the body. It is easy to take a measurement of the waistline; this is done measuring halfway between the lowest rib and the hipbone, in line with the navel. The measuring tape should be placed directly against the skin and normal breathing should be maintained. The measurement can then be checked.

If the waistline measurement is above 94 cm in a male patient, there is an increased risk of chronic disease and the risk is increased even more for a measurement above 120 cm. In females, if the measurement of the waist is above 80 cm then there is an increased risk of developing a chronic disease. This is increased greatly if the measurement is more than 88 cm.[12]

The body mass index (BMI) is the body fat determined though a comparison between the patient's height and weight. The body mass index is calculated by dividing weight in kilograms by height in meters squared. The weight ranges are: 1) underweight - less than 18.5, 2) healthy weight - 18.5 to 24.9, 3) overweight - 25.0 to 29.9, and 4) obese - 30.0 and above. It is essential that BMI not be used as the sole determinant of healthy body weight as this may fluctuate based on the muscle mass of a patient. Experts believe that the type of fat as well as the location of the fat in the body is more important than BMI, and paying attention to the waistline is key.

Healthy Food Choices

There should be an intake of less than 25% of calories coming from fat in the diet. A patient with diabetes mellitus should avoid fatty foods such as hot dogs, deli meats, pastries and snack foods. If there is no noticeable change in weight after a decrease in the number of calories from fatty foods, the patient should be encouraged to decrease the number of calories that

are taken into the body on an overall basis. The number of calories consumed is determined by the weight of the patient.

For patients with diabetes mellitus, it is best to have a guide that will clearly determine the foods that must be a part of their diet. This guide should be inclusive of those foods that may be selected by the patient. By making the best choices as it pertains to food in the diet, a patient will be able to maintain good health and extend their life span.

Good food choices help to maintain control of blood sugar levels. The positive and negative food choices for patients with diabetes mellitus are discussed here; these include those foods that are part of a balanced diet such as breads, grains and starches, fruits, meat, meat substitutes and protein, vegetables, fats oils and sweets and dairy.

Breads and Grains

Breads and grains along with the intake of minerals, fiber and vitamins, will contain complex carbohydrates that will be used by the body as sugar for energy. Under normal circumstances, sugar from breads and grains would make the glucose levels rise; however, complex carbohydrates are absorbed at a slower rate than simple carbohydrates and the body will need these carbohydrates for energy. There are particular complex carbohydrates that may be beneficial to a patient with diabetes.

Fruits and Vegetables

Fruits are naturally low in fat and sodium and contain fiber, minerals, vitamins as well as carbohydrates. Fruits are naturally made up of more carbohydrates than are found in vegetables.

Vegetables are full of vitamins, minerals and carbohydrates, and are usually comprised of fewer carbohydrates than are found in fruits. There are many vegetables that, unless they are obtained in a can, will contain fiber as well as they are naturally low in sodium and fat. Vegetables that are not included in this category are potatoes and carrots. These vegetables are included in the category of bread, grains and starch.

Meat and Protein

The group of meat and protein will contain foods such as beef, chicken, turkey, seafood, fish and pork. Other foods that are also included in this group will be tofu, eggs, cheese, nuts and beans. By selecting sources of protein that are not meat-based, a patient can lower the amount of fat that is consumed.

Dairy

Under dairy, there are foods such as milk and foods that are milk such as sour cream and yogurt. From milk, a patient will obtain calcium, minerals and protein.

Fats, Oils and Sweets

The food category of fats, oils and sweets are often high in calories and has very little nutritional value. Most snack foods are very high in fat, oil and sugar content. By consuming too many food items that fall into this food group, a patient is at risk of gaining weight, which will make it more difficult to keep diabetes under control. Although this category may not be very beneficial, a patient does not have to avoid all foods that fall in this category. They should however be advised on what foods may be consumed and to what level.

Beverages

Beverages are not always included in the food groups, which make it more difficult for a patient to be aware of what a good food choice is and what is not. Some beverages offer very little nutritional value but are very high in carbohydrates. It is very easy for beverages consumed to affect the patient's weight.

Exercise and Diabetes

By getting at least 150 minutes a week of exercise, a patient can lose weight and keep it off. The exercises that a patient can engage in include swimming, biking, and walking. Generally, the patient is encouraged to attempt to distribute the minutes of exercise evenly over the course of a week, such as, to exercise two days out of the week and to not miss long periods of time without exercise. If there are no other conditions that limit the patient's activities, there should also be resistance exercises added to the daily routine. This can include the lifting of weights to target the major muscle groups.

It is very important that a patient with diabetes mellitus engage in regular exercise. This will help in the management of the disease. Exercise is beneficial in improving blood sugar control and will assist in boosting the fitness level of the patient. It will also reduce the risks of developing heart disease or nerve damage. There are however unique challenges that are faced by a person with diabetes when exercising. It is important that the patient keep track of the blood sugar level before, during and after engaging in exercise. This will help to determine the reaction of the body to exercise and aid in preventing dangerous fluctuations in blood sugar.

Before Exercise

Before starting a fitness program, a patient must first be evaluated by a health clinician as physically safe to join the program. This is especially important for patients that were previously inactive. The projected fitness regimen should be discussed as well as the best time to carry out this exercise. There should be a clear review of the effects of medication on blood sugar as the patient becomes more active. In order to get the best health benefits from exercise, it is recommended that a patient carry out 150 minutes of exercise per week. Exercises the patient should be encouraged to engage in include moderately intense physical activities such as lap swimming, bicycling and fast walking.

Patients taking insulin and other medications which may cause hypoglycemia should test the blood sugar level 30 minutes before commencing exercise and immediately after engaging in exercise. This will assist the patient in determining whether or not the blood sugar level is stable, rising or falling and if it is safe to exercise. The general guidelines for blood sugar level and exercise are reviewed below.

- *Lower than 100mg/dl:*
  The patient's blood sugar level may be too low for safe exercise. A small snack containing carbohydrates such as cracker or fruits may be consumed before working out.

- *100 to 250 mg/dl:*
  This is the level at which it is safe to begin a work out.

- *250 mg/dl or above:*
  This level is deemed as the caution zone. Before beginning the workout, the patient must test the urine for ketone. If there are excess ketones, this is an indication that there is not enough insulin in the body to control the blood sugar level. By engaging in exercise with a high level of ketones, the patient is at a risk of ketoacidosis, which will require immediate medical attention. Workout must be postponed until there is a low level of ketones in the urine.

- *300 mg/dl or higher:*
  At this point, the blood sugar level is too high for the patient to exercise safely without being at risk of ketoacidosis. Exercise should be postponed until a safe pre-exercise range is achieved.

While engaging in exercise, there may be an increase in the whole body oxygen consumption by up to twenty-fold. Greater increases are likely to occur in the working muscles as well. In order to meet the energy needs brought on by these circumstances, the skeletal muscles will use, at an increased rate, the triglycerides and glycogen that has been stored. There will also be use of the free fatty acids that have been derived during the breakdown of triglycerides and glucose from adipose tissue, which is released from the liver.

In order for central nervous system function to be preserved, there is an impressive maintenance of blood sugar levels during physical activity. There is a low rate of occurrence of hypoglycemia in patients that do not suffer from diabetes mellitus. The metabolic adjustments that serve to preserve normoglycemia during exercise are mainly hormonally mediated. If there is a plasma insulin decrease, the presence of glucagon is necessary to increase

hepatic glucose production at an early stage during exercise. The hormonal adaptations that normally take place are mainly lost in insulin deficient patients with diabetes mellitus type I.

Blood Pressure For The Diabetic Patient

A patient with diabetes mellitus has to be very careful as it pertains to blood pressure control. This is one of the areas in which the patient has to make an effort to keep it well controlled. If a patient with diabetes has high blood pressure, they are at an increased risk of developing heart disease, strokes as well as other health complications. In order to treat high blood pressure, a patient has to make changes in their lifestyles, eliminating all risk factors that can be improved. There are medications that can be prescribed that will assist a patient in lowering the blood pressure.

Patients often struggle with how to understand blood pressure readings. The following is a helpful script for clinicians to adopt when educating patients about blood pressure measurements:

> *Blood pressure is the pressure of the blood in the blood vessels, also referred to as arteries. The measurement that is used for blood pressure is millimeters of mercury, mm Hg. Two figures are used to record the blood pressure; for example, x/y mm Hg. This is read as x over y. The first number will represent the systolic pressure, which describes the pressure in the arteries when the hearts contracts. The second figure is representative of the diastolic pressure, which describes the pressure in the arteries when the heart is at rest in between heartbeats.*

Teaching Diabetic Patients about Hypertension

Describing high blood pressure to a patient can often be met with a lot of questions, and even resistance. It is important for patients to develop an awareness that the higher the blood pressure, the greater their health risks. There are a few factors that will influence the level of the blood pressure and the determination of a high blood pressure will vary from patient to patient.

The point of cutoff at which the blood pressure is considered high for patients with diabetes is 140/80 mmHg and above. For patients that have diabetes, accompanied by a complication, such as kidney disease, the cutoff point is 130/70 mmHg. These cutoff points are lower in patients that do not have diabetes mellitus. High blood pressure therefore means that the patient's blood pressure remains at a figure higher than the cutoff point each time it is taken. This means that high blood pressure is not determined by one read but is based on a sustained level, which is higher than what it must be. A high systolic pressure, a high diastolic pressure, and both high systolic and diastolic pressures may determine the diagnosis of high blood pressure.

A diagnosis of high blood pressure cannot be made through one reading. A onetime blood pressure reading that is high does not mean that the patient has high blood pressure or hypertension. An individual's blood pressure varies throughout the span of a day. It can therefore be high for a short period if the individual is experiencing stress, anxiety or was exercising. A diagnosis of high blood pressure is generally made after more than two readings have been done that are consistently showing high results.

Often, patients have no knowledge that they are suffering from high blood pressure until a health clinician diagnoses it for them. High blood pressure is

described as being a silent problem. Blood pressure therefore should be checked at regular intervals for patients with diabetes mellitus.

Treatment of Hypertension

There are a number of ways in which a patient with high blood pressure can work to lower the level of their blood pressure. Some of these are listed as follows:

- Treatment plan made by health clinician.
- Flavoring foods with herbs and spices in place of salt.
- Consuming more whole-grain breads and cereals.
- Losing weight and making a conscious effort at keeping the weight off.
- Checking the labels of foods to determine which foods are lower than 400 mg of sodium per serving.
- Quitting smoking.
- Consulting a health clinician to determine what medications may be prescribed in order to reduce high blood pressure. Some medications that may assist this include calcium channel blockers, beta-blockers, angiotensin-converting-enzyme (ACE) inhibitors, diuretics and angiotensin-receptor-blockers (ARBs).
- Limiting the amount of alcohol that is consumed. A patient should consult with a health clinician before any alcohol is consumed to determine if it is safe to do so or not.

Smoking Cessation

It has been determined and documented by the American Diabetes Association (ADA) that there is a large amount of evidence based on epidemiological, cohort and case studies that provide a very convincing causal link between the smoking of cigarettes and health risks. Smoking is

determined to be the leading cause of avoidable morality in the United States.

Smoking accounts for 400,000 deaths per year. The smoking of cigarettes is the cause of one in every five deaths that occur in the United States and the biggest changeable cause of premature death. By smoking cigarettes, an individual is providing the body with nicotine, which is an addictive substance related to a number of biochemical, pharmacological and psychological processes. These processes will interact to support a pattern of use that becomes habitual.

Smoking is bad for the health in all individuals but more so in a patient that has diabetes mellitus. The nicotine that is found in cigarettes causes the small and large blood vessels to become hard and narrow, which will result in a reduction in blood flow to other parts of the body. Due to the fact that a patient with diabetes is already at an increased risk of nerve damage, kidney disease, stroke, foot problems and heart disease, smoking only increases these risks.

By quitting, a patient is improving the chances of not developing heart disease as well as other health complications. Through smoking cessation, a patient can:

- Improve overall health.
- Feel healthier and more energetic, as smoking can cause coughing and poor athletic abilities.
- Prolong their projected life span.
- Improve the sense of taste and smell.

- Improve physical appearance, as smoking may cause skin dullness and wrinkles, and stained teeth.
- Save money that would have otherwise been spent supporting the habit.

Supporting Diabetic Patients with Smoking Cessation

It is imperative that a person that suffers from diabetes mellitus quit smoking. Guidelines and tips for doing so have been provided as follows by the American Cancer Society:

- Stop carrying a lighter as well as matches and remove all ashtrays from the line of vision.
- When taken by the urge to smoke, take a deep breath and hold it for 10 seconds and release slowly. This is similar to smoking but the difference is clean air is being inhaled.
- Attempt to spend all free time in places where smoking is strictly prohibited such as the theater, museum and the library. Try to be surrounded by individuals who are also attempting to quit the habit and eat at non-smoking restaurants.
- Eat foods that are low in calories and high in nutritional value. This could be fresh fruit and crunchy, crispy vegetables. Cigarettes may be substituted with sugarless gum, as well as cloves, unbuttered popcorn, lemon drops or beef jerky.
- Relieve tension through engaging in regular exercise. For example, accessing stairs instead of an elevator and walking destinations that are easily walked.

Surgical Treatment For Diabetes

Diabetes complications and morbidity results from comorbid conditions, as reviewed earlier. These typically include heart disease, hypertension and other neurological disorders, such as neuropathy and chronic kidney disease. These comorbid conditions worsen as a result of chronic poor glycemic control stemming from unhealthy lifestyle habits and ultimately failure of the pancreas to release insulin into the blood system. Studies have shown that improving glycemic control will decrease rates of comorbid conditions secondary to poor blood sugar regulation. This section reviews the option of pancreas surgery, its risks and benefits.[9,15,69-73]

Pancreatic Transplant

A pancreatic transplant is a surgery in which a healthy pancreas is implanted in a patient with diabetes. This pancreas is given to the patient by a donor and will give the diabetic person a chance at not being dependent on insulin. A healthy pancreas is taken from a donor who is brain dead but still on life support. The donated organ must be carefully matched to the patient who will receive the transplant. In order to be transported from the donor to the recipient, the pancreas is stored in a cooled solution that will preserve the organ for a maximum of 20 hours.

During the operation, the patient's diseased pancreas is not removed; instead, the donor pancreas is placed in the lower right part of the abdomen. The blood vessels from the new pancreas are attached to the patient's blood vessels. As well, the donor duodenum is attached to the intestine or bladder of the patient. The duration for this surgery is approximately three hours and is done simultaneously with a kidney transplant for diabetic patients

who also have kidney disease. When combined however, the operation takes approximately six hours.

The key function of the pancreas is to produce insulin. This insulin will transport the glucose from the blood into the fat, muscles, and liver cells in order to be used for energy. In patients that suffer from diabetes mellitus type I, there is insufficient production of insulin or a complete lack thereof. Due to this fact, there is a buildup of glucose in the blood and this will lead to a high level of blood sugar in the blood. There are quite a few complications that may stem from this insulin inefficiency and consequent increase in blood sugar, such as, heart disease, kidney damage, amputation, stroke and blindness.

The pancreatic transplant can cure diabetes mellitus and eliminate the patient's dependency on insulin shots. There are a number of risks that are involved with this surgery and because of this many patients with diabetes mellitus type I opt against the surgery after initial diagnosis. This transplant surgery is rarely done independently and most often with a kidney transplant.

Pancreas transplant is not advised for patients that have the following conditions:

- Human immunodeficiency virus (HIV)
- Obesity
- A history of cancer
- Lung disease
- Severe heart disease
- Active infections such as hepatitis

- Lifestyle habits which may pose a threat to the new organ such as drug and alcohol use and smoking
- Other blood vessel diseases involving the neck and leg

The pancreas transplant is not recommended for patients who are unable to keep up with the many medical follow up requirements. These follow ups will include medication, tests, and visits that are necessary to maintain the health of the transplanted organ.

Risks Associated with Pancreatic Transplant Surgery

The following are risks associated with pancreatic organ transplant surgery:

- Problems with breathing
- Heart attack
- Stroke
- Reactions to medications
- Bleeding
- Scar formation
- Inflammation of the pancreas, known as pancreatitis
- Development of cancer within the following years
- Blood clots
- A clotting of the arteries or veins of the transplanted pancreas
- Rejection
- Infection or abscess
- Leakage of fluid from the transplanted pancreas at the point where it has been attached to the intestine or bladder

Anesthesia-related complications include reactions to medications and trouble with breathing.

Patient Teaching

Referral to the transplant center is made by a patient's physician where there is a transplant team trained to evaluate for pancreas transplant. This team will ensure that the patient is indeed a good candidate for the pancreas, and kidney if required, transplant. There will need to be several visits made by the patient over a period of weeks or months after being referred to a transplant center.

Required diagnostic testing will include labs (blood drawn for testing) as well as X-rays. The tests carried out for this procedure include:

- Blood and skin tests to check for infections
- Tests to detect early signs of cancer
- Tissue and blood typing to ensure that the donated pancreas and kidney will not be rejected by the body
- Heart tests such as electrocardiogram (EKG), cardiac catheterization and echocardiogram

The patient will need to consult with one or more transplant centers in order to fully determine the best decision for them. The patient will need to decide upon the following concerns:

- Find out how many transplants have been performed by the center annually and the survival rate. There will then need to be a comparison of numbers for the transplant centers.
- Find out about the support groups that are made available and the travel and housing arrangements offered by the transplant center.

A patient selected as a likely candidate to have a pancreas and kidney transplant performed will be placed on a national waiting list. This waiting list manages transplant procedures according to:

- Determination made based on a number of factors. These factors may include the likelihood of a successful transplant and the type of kidney problems that the patient is suffering from.

- No determination made by length of time on the list. The length of time that a patient remains on the waiting list is not a factor in deciding when a kidney will be available, with the exception of children.

While a patient is waiting for a pancreas and kidney transplant, there are specific steps that will need to be followed. These steps and guidelines include:

- No smoking.
- No consumption of alcohol.
- Taking all medication that has been prescribed. The patient should report all changes in medication as well as any new or worsening medical problems to the transplant team.
- Following the diet recommended by the transplant team.
- Following up at the regular health care provider.
- Keeping the body weight in the range that has been recommended by the transplant team.
- Ensuring that availability and a point of contact is there when contacted by the transplant team as soon as a pancreas and kidney are available. Quick and easy contact as well as a regularly updated point of contact should be made available to the transplant team.
- Staying prepared in advance to go to the hospital.

Recovery Following Pancreatic Transplant Surgery

The patient may need to stay in the hospital for seven days or longer after the procedure is done. After being discharged, the patient will need to maintain a close watch and regular blood tests must be done for two months or longer. There may be a recommendation from the transplant team for the patient to remain in close proximity to the hospital for the first three months after the procedure. The patient will need to do blood tests and X-rays regularly many years after the transplant has been done.

If the transplant is successful, then the patient will have no need for insulin shots, regular blood sugar testing or following a diabetes diet. Evidence has shown that the risk of particular complications associated with diabetes mellitus, such as diabetic retinopathy, may be reduced and may improve after the pancreas-kidney transplant. Statistically, over 95% of patients survive after the first year of having the transplant. Organ rejection will occur in 1% of patients each year. Immunosuppressive drugs are prescribed for patients in order to minimize the chances of organ rejection.

Gastric Bypass Surgery and Diabetes Remission

This section discusses gastric bypass as it pertains to diabetes mellitus and disease management. Gastric bypass surgery is a type of bariatric or weight loss surgery. This procedure will alter the process of digestion and nutritional absorption. This procedure, to date, is the only option available for morbidly obese individuals where measures, such as diet, medication and exercise, have not worked that has proven to be effective.

There are three main ways in which this surgery will work:

- Restriction, which is the limiting of the amount of food intake by making a reduction in the size of the stomach.

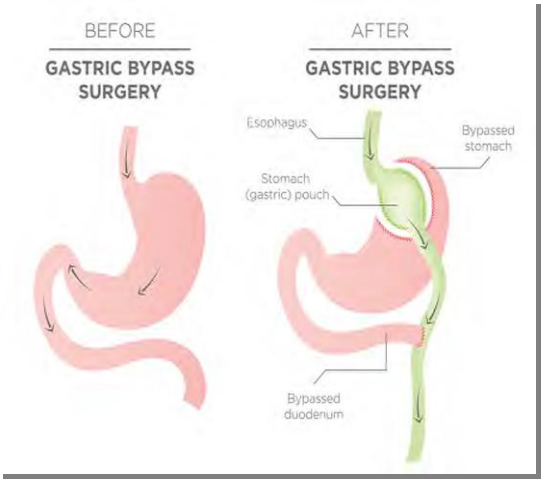
- Malabsorption, which is the limiting of the absorption of food in the intestinal tract by bypassing a portion of the stomach to varying degrees.
- A combination of both restriction and malabsorption.

A new study has been published that has shown a third of patients with diabetes mellitus type II have been cured of the disease. As it pertains to diabetes mellitus and gastric bypass surgery, being cured describes being *in remission* for an extent of six years *following* gastric bypass surgery. Researchers have also found that by undergoing bariatric surgery, patients with diabetes mellitus have also had a decrease in the level of risk for cardiovascular disease.

There is also evidence to show that there have been improvements in diabetic nephropathy, or that it has been completely resolved. Of all patients in the study, 27% have been in complete remission for five consecutive years, which is the operational definition of cure by ADA standards.[15] These studies help to illustrate for patients how durable these procedures may be. Further, in cases where the diabetes symptoms returned, it was milder.

Malabsorption

In gastric bypass, dividing the small intestine surgically in a certain area allows for the malabsorptive component. Once the intestine is divided, the lower section, the jejunum, is then pulled up in order for it to be connected with the small pouch, which acts as a new stomach. The other



section of the intestine is then sewn back at a point in the intestine that is farther down. The intestine is shaped similar to the letter “Y”; and, for this fact, when a patient that has had gastric bypass surgery consumes a meal, the food will enter into the small pouch and then travel to the jejunum. This will mean that it will bypass the upper section of the intestine. By bypassing this section of the intestine, there will be less absorption of nutrients and calories into the body.

Within a period of up to two years after surgery, gastric bypass patients have been reported with having two-thirds weight loss. Gastric bypass, because of the malabsorptive factor, may lead to an increased risk of nutritional deficiencies. It is therefore imperative that patients follow up with their health clinician for nutritional supplementation.

The potential candidates for a bariatric surgery include:

- Individuals who have a body mass index which is greater than 40.
- Men who have an excess of 100 pounds over the ideal body weight.
- Women who have an excess of 80 pounds over the ideal body weight.
- Individuals who have a BMI of 35 and above who also have another health condition, which is related to obesity such as sleep apnea, heart disease and type II diabetes.

Gastric bypass surgery, as any other, has a number of serious side effects. This means that before the surgery is performed, the long-term health benefits must be weighed and analyzed, and then found greater than the risk of surgery in order for the procedure to be carried out. All bariatric surgery is considered to be a major surgery although some surgical techniques may be done laparoscopically with a decreased level of risk.

The health risks associated with bariatric surgery are not known entirely; however, bariatric surgery in general has assisted many patients in reducing weight as well as eliminating the health risks and complication that are related to obesity. Bariatric surgery may assist in achieving the following health benefits:

- Lowering the blood pressure
- Lowering the blood sugar
- Decreasing the workload of the heart
- Lowering the level of cholesterol
- Reducing or entirely eliminating sleep apnea

On the other hand, the risks and complications that are associated with bariatric surgery include:

- Blood clots
- Infection
- Bleeding ulcer
- Pneumonia
- Gastrointestinal hemorrhage
- Development of gallstones

Surgery, in order to assist in weight loss, is not a universal remedy. Bariatric surgery may, however, be very effective in individuals who are able to stay motivated following the procedure to visit their health clinician and to follow the guidelines for exercise and nutrition. Nutritional supplements, such as multivitamins and electrolytes, must also be taken.

Gastric Banding Surgery and Weight Loss

One of the most recent techniques being utilized in weight loss surgery is gastric banding. Gastric banding will restrict the amount of food that the

stomach is able to hold and does this with a small degree of change to how the food is absorbed. The procedure is also referred to as laparoscopic adjustable gastric banding (LAGB) because of the way that it is performed. The two forms of gastric banding available are: 1) Lap-band and 2) Realize band.

The procedure works mainly as a *restrictive* bariatric surgery and the adjustable band that is placed around the upper part of the stomach will create a pouch in the upper stomach. There are periodic adjustments that are made through the adjusting port that is sewn under the skin of the abdomen. In order to adjust the banding balloon, a bariatric surgeon will add saline fluid to tighten it or will remove fluid in order to make it looser. The band is used to control the rate at which the food will pass through the small stomach pouch and how quickly the patient will feel full. There is less risk involved in banding than there is in doing a gastric bypass, and gastric banding may be reversible.

Forms Of Diabetes And Medical Management: In Review

Diabetes Mellitus is deemed as a disorder of metabolism. This section will include an expanded discussion on the general forms of diabetes throughout the lifespan, and the medical management of each.[8,9,13-15,59-68]

Overview

Metabolism depicts the manner in which food is digested by the body to enable growth and provide energy. A great amount of the food that is consumed by an individual is broken down into glucose. To briefly review, glucose is a form of sugar in the blood that is the chief supply of fuel for the entire body. After being digested, glucose passes into the bloodstream

where it will be used for growth and fuel by the cells. In order for glucose to enter the cells successfully, a sufficient amount of insulin has to be present. Insulin is the hormone produced by the pancreas.

Diabetes mellitus type I (T1DM) is the most common of the types of diabetes that prevails in children. This immune-mediated diabetes form of type I diabetes may be described as an autoimmune disorder, and is a condition where the immune system of the human body destroys, or makes an attempt at destroying, the cells of the pancreas that are responsible for the production of insulin. *Immune-mediated diabetes* accounts for 5% to 10% of patients with diabetes. Type I diabetes is one of the most common of the chronic diseases that affect children.

Formally referred to as juvenile diabetes or insulin dependent diabetes, T1DM occurs as a result of the *autoimmune destruction of the beta cells* that produce insulin in the pancreas. This decrease in insulin in T1DM results in an increased level of glucose in the blood and the urine. Some very common symptoms that occur with high glucose levels are an increased feeling of thirst (polydipsia), a frequency in urination (polyuria) and significant weight loss. If T1DM goes left untreated for a long duration, the results may be fatal unless treated and controlled with supplemental insulin.

Gestational Diabetes

Another common type of diabetes mellitus that needs to be differentiated from other forms of the disease is *gestational* diabetes mellitus, simply known as gestational diabetes or GDM. Gestational diabetes is a condition that is unique to pregnant women, more particularly pregnant woman that had *no prior* diagnosis of diabetes. These pregnant women will display a high blood glucose level during their pregnancy. This will generally occur at a

higher rate while the woman is in the third trimester. It has been a long-standing topic of debate over the years as to whether or not an increase in the blood glucose level is a normal, natural part of being pregnant.

Gestational diabetes occurs when the insulin receptors are unable to function properly. This malfunctioning of the insulin receptors may be caused by pregnancy-related factors. One of these factors may be the presence of human placental *lactogen* that will interfere with the insulin receptors, which are already vulnerable. This will then cause a rise in the blood sugar to an inappropriately high level.

Neonatal Diabetes

Neonatal diabetes mellitus, which is also known as NDM, is another form of diabetes that is considered to be monogenic. This form of diabetes occurs within the first six months of a baby's life and is a very rare condition. This condition is only diagnosed in one in 100,000 to 500,000 live births. Infants that are born with the condition are not able to produce an adequate amount of insulin and this lack of insulin will lead to an increase in the blood glucose.

Neonatal diabetes is often mistaken for diabetes mellitus type I and it is often diagnosed as such. However, type I diabetes is not commonly seen within the first six months of life and occurs more commonly after the first six months of birth. Approximately half the cases of neonatal diabetes that has been seen have been lifelong conditions. There are 50% of patients that have it for a lifetime, and are known to have what is referred to as *permanent* neonatal diabetes mellitus (PNDM).

Idiopathic Diabetes

There are some forms of type I diabetes that have no known etiologies whatsoever, that is, there is no known source of the disease. *Idiopathic* is the term that is generally given to rare forms of a disease that have no established cause.

Some patients will present with evidence of permanent inadequacy of insulin secretion and will be evidenced to be prone to ketoacidosis as well as showing no sign of autoimmunity. Although the number of patients with type I diabetes placed in this category of the disease is a very small one, most of the patients who will fall in this group will be of Asian, Hispanic or African descent. For those patients that have this form of type I diabetes, there will be episodes of ketoacidosis as well as an exhibition of a varying level of deficiency of insulin in the time that elapses between these episodes.

Diabetes Mellitus Type II in Contrast to Type I

Diabetes mellitus type II is the form of the disease defined by the high level of blood glucose found in the blood relative to insulin resistance and comparative insulin deficiency. This form of diabetes mellitus is typically known as adult onset diabetes (AODM) as well as noninsulin dependent diabetes mellitus (NIDDM). This type of diabetes may be defined by its contrast to the type I form of diabetes where there is complete deficiency in insulin, which results from the depletion of beta cells in the pancreas.

The common symptoms seen in patients with type II diabetes are an increased frequency in urination, an excessive feeling of thirst and a constant need to eat. Of all the patients that suffer from diabetes, 90% of the population have type II diabetes with all of the other 10% of cases suffering either from type I diabetes as well as gestational diabetes. The

main cause of type II diabetes is believed to be obesity for those patients that are genetically affected by the disease. In the initial stages of type II diabetes, it is monitored according to certain criteria, such as patient exercise and modification of the patient's dietary practices.

If lifestyle modification strategies are applied and there is not an adequate decrease seen in the level of blood glucose, then medication will be indicated such as daily insulin or metformin. For those patients that require insulin medication, there is usually a need for constant monitoring of the blood sugar level. There has been a marked increase in the cases of diabetes type II that have emerged over the last fifty years. This corresponds with the comparative increase that may be seen in obesity cases as well.

The occurrence of type II diabetes was for a few decades seen mostly in the Western countries. However, currently diabetes is not peculiar to the Western regions, and cases have in recent years spread across the entire world and affected every country. This epidemic may be related to the increasing popularity of the Western diet. In previous years many countries chose not to adapt certain foods of the West, whereas now there is wide-spread acceptance of the Western diet in many countries. The Western diet is typically considered to be excessive in caloric intake, which is one of the factors contributing most to obesity and type II diabetes cases worldwide.

Maturity Onset Diabetes of the Young

One of the less commonly seen forms of diabetes is maturity onset diabetes of the young (MODY). Previous diabetes series have explained this form of diabetes as being caused by a mutation in numerous different genes. MODY is what is considered a *monogenic* form of diabetes. Each of the genes that become mutated will have its own unique impact and will cause a slightly

different type of diabetes. The most common forms of this gene mutation that occurs in MODY are HNF1α-MODY (MODY3) and GCK-MODY (MODY2).

The mutations that occur in the HNF1A genes are the causes behind MODY3, while the cause of MODY2 involves mutations that occur in GCK genes. MODY is a very uncommon form of diabetes mellitus and cases are rarely seen. This is one of the primary reasons that it is often mistaken for type II diabetes. Mistaken diagnosis of type II diabetes rather than the right identification of *genetic mutations* leading to maturity onset diabetes also occurs due to the fact that in both occurrences there is no need for insulin as a treatment, especially not in the initial stages of the disease.

Pre-diabetes

The term *pre-diabetes* describes the state in which some of the diagnostic criteria for diabetes are met but not quite all of them. This is normally referred to as the *midpoint or gray area* between a normal blood sugar and a blood sugar that has reached diabetic proportions. A patient that is observed to have pre-diabetes has a very high risk of developing type II diabetes within a decade. The development of pre-diabetes may be hindered by adoption of a healthier lifestyle, which will involve an increase in physical activity as well as loss of weight. A patient that has pre-diabetes is also at an elevated risk of developing heart disease.

Prior to a patient being diagnosed with diabetes mellitus, the disease is often not recognized. One of the primary reasons for this unawareness is due to the fact that independently, the symptoms of the disease appear to not be very dangerous. If a patient is diagnosed closer to the initial onset of diabetes mellitus, the less likely it is for a serious complication in the future to occur. The symptoms can be very subtle and appear outwardly harmless

when symptoms do occur, especially in a patient with diabetes mellitus type II. The risk is therefore increased if the disease goes undetected as complications may still occur even if there are no noticeable symptoms of the disease. Recognizing the possible symptoms of diabetes will give a patient greater opportunity at a healthier life and a lower risk of developing complications.

It's important to focus on fluctuations in a patient's weight, which we know are a common symptom of diabetes mellitus. Patient monitoring requires follow up of any constant need to urinate, as there will be a loss of sugar caused by frequent urination. The loss of sugar will then lead to a loss of calories as well. The loss of calories may be connected to the kidney having to work to reduce the excess sugar. Polyphagia, or excessive hunger, results from a constant inability of cells to uptake glucose; this must be documented and included in the treatment plan. Since glucose is unable to enter the cells where it may be used in the form of energy, the body reacts similar to being starved.

Polyuria, frequent urination with an excess of excreted glucose in the urine, becomes triggered in diabetes mellitus. This occurs because glucose is a very powerful osmolyte, which is a substance like urea and sodium that is able to stimulate water to follow after it. Since the glucose level that is found in the urine will exceed the normal amount, there will also be excess in water as well. This causes polyuria to occur. Polyuria may also occur along with polydipsia even though one may occur without the presence of the other.

Polydipsia is an in increase in the level of thirst that an individual may experience. It is common for the polydipsia to be either the cause or the

effect of polyuria. Polydipsia (excessive thirst) will be experienced by a patient that has uncontrolled diabetes mellitus. It is considered to be very abnormal behavior. Health clinicians need to remain alert to the fact that this symptom will occur in a patient that has diabetes mellitus in the initial onset of the disease; additionally, polydipsia, or excessive thirst, may occur in those patients that have already been diagnosed with the disease and are being treated but who may refuse to take their medication or are not being treated with the adequate medication dosage.

A number of other health conditions coinciding with polydipsia may occur such as hypokalemia, a co-occurring hemorrhage where the blood volume will be decreased, as well as other conditions that may cause a shortage of water in the body. Polydipsia will also normally result from osmotic diuresis as well as being caused by diabetes insipidus, which is known as *tasteless* diabetes.

Another common symptom experienced by a diabetic patient as previously raised includes *polyphagia*. Polyphagia is often referred to as *hyperphagia*, and describes the feeling of excessive hunger or an unusually large appetite. The expression was derived from the Greek words *poly*, which means '*very much*', and *phago,* which means '*to eat*'. In medical terms, polyphagia describes the feeling of extreme levels of hunger and an abnormal amount of oral solid food intake.

Polyphagia will be seen in the very *early stages* of diabetic ketoacidosis. It must be noted however, that as the deficiency of insulin begins to increase, the appetite will simultaneously decrease as ketoacidosis develops. Polyphagia is known to be one of the three main symptoms, the other two symptoms being polyuria and polydipsia discussed earlier. The increase in a

normal individual's level of hunger and appetite usually comes as a response to strenuous exercise or after rigorous exercise. In polyphagia, however, it is important to recognize that this increase in appetite may be a result of stress, depression or anxiety.

Microvascular and Macrovascular Damage

This section will expand upon the microvascular and macrovascular damage than can occur with diabetes mellitus.

Eye problems are often a sign of advancing disease that health clinicians need to follow up. The retina is comprised of a group of specialized cells that is able to convert light to images as it enters the lens. The nerve in the eye, which is known as the optic nerve, will then transmit the information to the brain. Diabetic retinopathy is one of the blood vessel-related complications of diabetes mellitus. The eye problem, which is associated with diabetes, is caused by damage of the small vessels in the eye and is referred to as a microvascular complication.

Kidney disease and nerve damage are also put into the category of microvascular complications. Larger blood vessel damage is known as macrovascular complications and includes heart disease and stroke.

The complications that fall under the category of microvascular complications are shown to relate to high levels of blood sugar. By having good control of the blood sugar, a patient with diabetes mellitus is able to reduce the risk of developing microvascular complications, such as those affecting the eyes and kidneys.

When diabetes mellitus, as well as pre-diabetes, is diagnosed, blood tests must be utilized to carry out the diagnosis. This method of diagnosis is used because, as mentioned earlier, there are little or no symptoms associated with type II diabetes in the initial onset of the disease.

All blood tests done for diabetes mellitus will involve the drawing of blood from the patient under a sanitized and secure environment. When the blood is drawn, it is then forwarded to a laboratory for the blood analysis to be done; this ensures accuracy of results. The instruments used in the measuring of glucose in a normal health facility may not assure the level of accuracy needed to make such an analysis, but, will allow for efficacy to determine high blood glucose levels. When testing is done, it allows for action to be taken at early stages of the disease in order to avoid complications.

Rigorous diagnostic measures must be taken to ensure the treatment of pre-diabetes as doing so may stop or delay the development of diabetes mellitus type II. The fasting plasma glucose (FPG) test is the measure that determines the blood glucose level, which is used in the diagnosis of diabetes mellitus. These are very simple tests, also considered to be inexpensive tests, used to diagnose diabetes.

Medical clinicians rely on standard diagnostic laboratory tests for diabetes mellitus because what they primarily do is to expose any issues and problems that may be present with a patient's insulin functions. Periods of prolonged fasting can result in a triggering of the hormone glucagon, produced by the pancreas, initiating the release of glucose into the bloodstream from the liver. The expected reaction from the body is to

produce insulin, which will prevent the onset of high blood sugar (hyperglycemia).

Casual plasma glucose, like all plasma glucose testing, is carried out in order to measure the level of glucose that is being circulated in the blood. This is also referred to as the 'random' plasma glucose and the casual or random glucose may be drawn at any time. The test will not be affected by having fasted or eaten before being carried out. If the results obtained from a casual plasma glucose test gives a result of 200 mg/dl or higher, this is indicative of a likely diagnosis of diabetes mellitus and a concern for microvascular and macrovascular co-occurring disease processes. In order to be completely accurate with the diagnosis, a follow up test must be done on another day using the same kind of test. In addition to this test being done, a fasting plasma glucose test may also be carried out subsequently.

In the presence of co-occurring disease processes, the initial red blood markers, used to identify at-risk patients in the pre-diabetic state, are continually used for long-term monitoring. Glucose is known to be attracted to, and attach to the hemoglobin that results in another molecule referred to as the hemoglobin A1C or HbA1C.

The HbA1C has been discussed at length in prior courses, however, its important to emphasize here that a higher level of blood glucose will indicate a higher level of HbA1C, which is also present in the blood. Before being replaced, the red blood cells will remain alive for a period of 8-12 weeks. When the HbA1C is measured, it will indicate the level of the blood glucose over the course of the 8-12 week duration. The normal or non-diabetic range for the HbA1C result is generally 3.5 to 5.5%.

Medication Treatment: Insulin, Oral Agents or Both?

Insulin therapy for patients with diabetes mellitus type I and type II[38] or a HbA1C level that is greater than 9% is a recommended part of the diabetic treatment plan. In diabetes mellitus type II, insulin may also be prescribed if the disease is uncontrolled after oral glycemic therapy. The initiation of insulin therapy may be as augmentation and will start at 0.3 unit per kg; additionally, it may be initiated as replacement and start at 0.6 to 1.0 unit per kg. If the therapy is for replacement, then 50% of the total daily insulin dose is administered as basal, while the other 50% is given as bolus and is divided up among the three meals of the day. Augmentation therapy may either be as bolus or basal insulin.

Metformin is usually the first choice for oral therapy in patients with diabetes mellitus type II. This is prescribed when the patient is showing no response to lifestyle changes that were previously tried. In the event that metformin monotherapy fails to control hyperglycemia, a second medication may be prescribed. Currently, there are a total of 12 classes of drugs approved for the treatment of hyperglycemia in patients with diabetes mellitus type II (see: DIABETES TREATMENT AND MOTIVATIONAL INTERVIEWING, Diabetes Series Part III). It has been generally observed that most diabetic patients will require more than one of these medications.

Adjuvant Non-Pharmacological Therapy

While pharmacological interventions help to regulate the blood sugar level, lifestyle choices are key to successful outcomes. Diabetes mellitus, through alterations in the patient's lifestyle, may also be successfully treated as a result of motivational interviewing. In research carried out on the health related changes in behavior, the importance of motivation, resistance and

ambivalence have been highlighted, and cannot be overemphasized as a valuable counseling method utilized to increase the patient's desire to change through four basic principles of 1) establishing partnership, 2) listening to the patient, 3) identifying and resolving ambivalence, and 4) emphasizing autonomy.

There have been recent meta-analyses on motivational interviewing (MI) for treatment of alcohol and drugs in both adults and adolescents, which have shown MI to be effective to reduce substance use. There has also been evidence to indicate that MI is also beneficial in smoking cessation (reducing resistance to treatment and medication), and in the avoidance of risky sexual behaviors. Motivational interviewing has also been studied to be effective in the management of diabetes mellitus, as well. Primary care clinicians face many challenges in the treatment of diabetes, however, one of the greatest challenges is assisting patients to alter long-term behaviors that pose a threat to their health. The latest research and literature on motivational interviewing suggest MI as a necessary area of continuous clinical practice improvement and professional development for clinicians engaged in care of the diabetic patient to encourage their patients to best manage their disease and have life-long healthy behaviors.

Summary

Diabetes mellitus is and can be a dangerous disease if not treated. There has been observed increases in the worldwide number of diabetic cases. Health clinicians who have more direct contact with diabetic patients have an important role to help patients be more aware of the health risks and complications of the disease. Efforts must be made to lower the number of patients being diagnosed with diabetes each year. Patients must be encouraged to lead a healthy lifestyle through a proper, nutritional diet,

exercise, and by regular following ups with their primary care clinician for annual checkups, especially if they have a family history of diabetes mellitus.

This course, the final of a 4-part continuing education series on diabetes, specifically focused on the very important topic of diabetic lifestyle choices and related conditions, including gestational and neonatal diabetes. The value of motivational interviewing to encourage diabetic patients to make healthy decisions to manage their disease was emphasized. Individuals that have already been diagnosed with diabetes mellitus are in need of ongoing support, education and motivational counseling from their diabetic health team to guide patients to lead a more fulfilled and healthy life. Diabetic clinicians support patients by explaining their options, such as lifestyle, medication management and surgical interventions, namely bariatric surgery (lap banding or gastric bypass) or pancreatic organ transplant surgery. Medical, surgical and lifestyle management guidelines must be implemented based on the patient's individual case. Although diabetes mellitus may be a lifelong disease, there should be no reason that this should stop individuals throughout their entire life from living a healthy and full life.

Please take time to help NurseCe4Less.com course planners evaluate the nursing knowledge needs met by completing the self-assessment of Knowledge Questions after reading the article, and providing feedback in the online course evaluation.

Completing the study questions is optional and is NOT a course requirement.

1. **Blood Pressure is defined as**

    a. the pressure of blood in the arteries.
    b. amount of blood pumped to the heart.
    c. the pressure of blood in the organs.
    d. pressure of blood in the liver.

2. **What effect does nicotine that is in cigarettes have on the blood vessels?**

    a. No effect
    b. It hardens and narrows blood vessels
    c. It widens blood vessels
    d. It causes them to soften

3. **The blood glucose level before it is safe to exercise is**

    a. lower than 100mg/dl.
    b. 250 mg/dl and above.
    c. 100-250mg/dl.
    d. 300mg/dl.

4. **In pancreatic transplant procedures, a healthy pancreas is obtained from**

    a. a brain dead donor who is still on life support.
    b. a deceased person.
    c. a pancreatectomy performed within the past 20 hours.
    d. the patient's closest living relative.

5. **Gastric bypass surgery alters the process of _____.**

    a. reproduction
    b. digestion
    c. metabolism
    d. respiration

6. **True or False: It is essential that BMI (body mass index) not be used as the sole determinant of healthy body weight as this may fluctuate based on the muscle mass of a patient.**

    a. True
    b. False

7. After being digested, glucose passes into the bloodstream where it will be used for growth and fuel by the cells but in order for glucose to enter the cells successfully, a sufficient amount of _____ has to be present.

a. sugar
b. oxygen
c. sodium
d. insulin

8. By making changes to the diet, patients with diabetes mellitus can

a. lower blood sugar level.
b. reduce risk of heart disease.
c. reduce risk of stroke.
d. All of the above

9. By choosing their food wisely, diabetic patients

a. can discontinue their medication.
b. may be cured.
c. may increase their life expectancy.
d. don't need to exercise.

10. _____ is used to measure or calculate body fat.

a. Measuring the waistline
b. Measuring the Body Mass Index
c. Measuring blood-sugar levels
d. Answers a., and c., are correct

11. A body mass index (BMI) of _____ is considered a healthy weight.

a. less than 18.5
b. 18.5 to 24.9
c. 25.0 to 29.9
d. around 30.0

12. Gastric bypass may help to

a. lower cholesterol level.
b. reduce sleep apnea.
c. lower blood sugar.
d. All of the above

13. Which of the following factors is most important in determining an individual's healthy weight?

a. A person's BMI
b. The individual's height
c. The person's diet
d. The type and location of the fat in the body

14. A nurse is talking to a patient, who has a BMI of 30.0, about weight loss and the goal the patient should set. The nurse should advise the patient as follows:

a. Lose as much weight as quickly as possible.
b. Do not start if you can't follow through.
c. A reasonable goal is to lose 7% of current weight.
d. You have to lose 10 percent of your current weight.

15. There should be an intake of less than _____ of calories coming from fat in the diet.

a. half
b. 10%
c. 25%
d. 1/3

16. Fruits are recommended as part of a person's diet because

a. they are a good source of simple carbohydrates.
b. they are naturally low in fat and sodium.
c. they have lower levels of carbohydrates than do vegetables.
d. they are low in fiber but high in minerals and vitamins.

17. True or False: Carrying excess fat in the abdominal area is more dangerous than having fat anywhere else on the body.

a. True
b. False

18. Patients taking medications which may cause _____ should test their blood sugar level 30 minutes before commencing exercise and immediately after engaging in exercise.

a. hypoglycemia
b. hypertension
c. hyperglycemia
d. hyponatremia

19. A patient with a blood glucose level of 250 mg/dl or above wants to begin his or her exercise workout for that day. The patient should be advised

a. to take a urine test for ketone.
b. that exercise will lower the blood glucose level.
c. to not take insulin until levels are normalized.
d. to reduce food intake until levels are normalized.

20. A diabetic patient who has kidney disease as an additional complication is considered to have high blood pressure if blood pressure readings are equal to or higher than

a. 140/80 mmHg
b. 125/60 mmHg
c. 160/80 mmHg
d. 130/70 mmHg

21. True or False: In patients with diabetes mellitus, diagnosis of high blood pressure requires at least one reading of a high systolic *and* diastolic pressure.

a. True
b. False

22. During a pancreas transplant operation,

a. the patient's diseased pancreas is removed.
b. the donor's duodenum is also transplanted.
c. a kidney transplant is also performed.
d. the donor pancreas is placed where the patient's pancreas was.

23. Researchers have also found that by undergoing _____, patients with diabetes mellitus may reduce their risk for cardiovascular disease.

a. bariatric surgery
b. pancreas transplant
c. kidney transplant
d. duodenal surgery

24. Gastric banding involves

a. the cutting of the stomach.
b. a stomach transplant.
c. the removal of the stomach.
d. banding that restricts how much food the stomach holds.

25. True or False: In diabetic patients who also have kidney disease, a pancreas transplant operation should not be performed at the same time as the kidney transplant because the patient's blood glucose level needs time to stabilize.

a. True
b. False

CORRECT ANSWERS:

1. **Blood Pressure is defined as**

    a. the pressure of blood in the arteries.

    "*Blood pressure is the pressure of the blood in the blood vessels, also referred to as arteries.*"

2. **What effect does nicotine that is in cigarettes have on the blood vessels?**

    b. It hardens and narrows blood vessels

    "*The nicotine that is found in cigarettes causes the small and large blood vessels to become hard and narrow, which will result in a reduction in blood flow to other parts of the body.*"

3. **The blood glucose level before it is safe to exercise is**

    c. 100-250mg/dl.

    "*The general guidelines for blood sugar level and exercise are reviewed below…. 100 to 250 mg/dl: This is the level at which it is safe to begin a work out.*"

4. **In pancreatic transplant procedures, a healthy pancreas is obtained from**

    a. a brain dead donor who is still on life support.

    "*A pancreatic transplant is a surgery in which a healthy pancreas is implanted in a patient with diabetes. This pancreas is given to the patient by a donor and will give the diabetic person a chance at not being dependent on insulin. A healthy pancreas is taken from a donor who is brain dead but still on life support. The donated organ must be carefully matched to the patient who will receive the transplant. In order to be transported from the donor to the recipient, the pancreas is stored in a cooled solution that will preserve the organ for a maximum of 20 hours.*"

5. Gastric bypass surgery alters the process of _____.

b. digestion

"*Gastric bypass surgery is a type of bariatric or weight loss surgery. This procedure will alter the process of digestion and nutritional absorption.*"

6. True or False: It is essential that BMI (body mass index) not be used as the sole determinant of healthy body weight as this may fluctuate based on the muscle mass of a patient.

a. True

"*It is essential that BMI not be used as the sole determinant of healthy body weight as this may fluctuate based on the muscle mass of a patient.*"

7. After being digested, glucose passes into the bloodstream where it will be used for growth and fuel by the cells but in order for glucose to enter the cells successfully, a sufficient amount of _____ has to be present.

d. insulin

"*After being digested, glucose passes into the bloodstream where it will be used for growth and fuel by the cells. In order for glucose to enter the cells successfully, a sufficient amount of insulin has to be present. Insulin is the hormone produced by the pancreas.*"

8. By making changes to the diet, patients with diabetes mellitus can

a. lower blood sugar level.
b. reduce risk of heart disease.
c. reduce risk of stroke.
d. All of the above *[correct answer]*

"*By making changes to their daily diet, patients with diabetes mellitus may be able to improve their overall health. These changes may include lowering the blood sugar level as well as reducing the risks of stroke and heart attack.*"

9. By choosing their food wisely, diabetic patients may

c. increase their life expectancy.

"*For patients with diabetes mellitus, it is best to have a guide that will clearly determine the foods that must be a part of their diet. This guide should be inclusive of those foods that may be selected by the patient. By making the best choices as it pertains to food in the diet, a patient will be able to maintain good health and extend their life span.*"

10. _____ is used to measure or calculate body fat.

b. Measuring the Body Mass Index

"*Body mass index (BMI) is a measurement that is used to calculate body fat.*"

11. A body mass index (BMI) of _____ is considered a healthy weight.

b. 18.5 to 24.9

"*The body mass index (BMI) is the body fat determined though a comparison between the patient's height and weight. The body mass index is calculated by dividing weight in kilograms by height in meters squared. The weight ranges are: 1) underweight - less than 18.5, 2) healthy weight - 18.5 to 24.9, 3) overweight - 25.0 to 29.9, and 4) obese - 30.0 and above.*"

12. Gastric bypass may help to

a. lower cholesterol level.
b. reduce sleep apnea.
c. lower blood sugar.
d. All of the above *[correct answer]*

"*Gastric bypass surgery is a type of bariatric or weight loss surgery…. bariatric surgery in general has assisted many patients in reducing weight as well as eliminating the health risks and complication that are related to obesity. Bariatric surgery may assist in achieving the following health benefits: Lowering the blood pressure; Lowering the blood sugar; Decreasing the workload of the*

heart; Lowering the level of cholesterol; Reducing or entirely eliminating sleep apnea."

13. Which of the following factors is most important in determining an individual's healthy weight?

d. The type and location of the fat in the body

"*Experts believe that the type of fat as well as the location of the fat in the body is more important than BMI, and paying attention to the waistline is key."*

14. A nurse is talking to a patient, who has a BMI of 30.0, about weight loss and the goal the patient should set. The nurse should advise the patient as follows:

c. A reasonable goal is to lose 7% of current weight.

"*A healthy BMI is less than 25 and a patient should be advised to lose weight if the BMI is found to be above 25. A reasonable goal to set is 7% of the current weight."*

15. There should be an intake of less than _____ of calories coming from fat in the diet.

c. 25%

"*There should be an intake of less than 25% of calories coming from fat in the diet."*

16. Fruits are recommended as part of a person's diet because

b. they are naturally low in fat and sodium.

"*Fruits are naturally low in fat and sodium and contain fiber, minerals, vitamins as well as carbohydrates. Fruits are naturally made up of more carbohydrates than are found in vegetables."*

17. True or False: Carrying excess fat in the abdominal area is more dangerous than having fat anywhere else on the body.

a. True

"*An increase in the waistline may act as a good indication of the risk of developing serious chronic health conditions. This may be due to the fact that carrying excess fat in the abdominal area is more dangerous than having fat anywhere else on the body.*"

18. Patients taking medications which may cause _____ should test their blood sugar level 30 minutes before commencing exercise and immediately after engaging in exercise.

a. hypoglycemia

"*Patients taking insulin and other medications which may cause hypoglycemia should test the blood sugar level 30 minutes before commencing exercise and immediately after engaging in exercise. Exercise is beneficial in improving blood sugar control and will assist in boosting the fitness level of the patient. It will also reduce the risks of developing heart disease or nerve damage.*"

19. A patient with a blood glucose level of 250 mg/dl or above wants to begin his or her exercise workout for that day. The patient should be advised

a. to take a urine test for ketone.

"*This level is deemed as the caution zone. Before beginning the workout, the patient must test the urine for ketone. If there are excess ketones, this is an indication that there is not enough insulin in the body to control the blood sugar level. By engaging in exercise with a high level of ketones, the patient is at a risk of ketoacidosis, which will require immediate medical attention. Workout must be postponed until there is a low level of ketones in the urine.*"

20. A diabetic patient who has kidney disease as an additional complication is considered to have high blood pressure if blood pressure readings are equal to or higher than

d. 130/70 mmHg

"*The point of cutoff at which the blood pressure is considered high for patients with diabetes is 140/80 mmHg and above. For patients that have diabetes, accompanied by a complication, such as kidney disease, the cutoff point is 130/70 mmHg.*"

21. True or False: In patients with diabetes mellitus, diagnosis of high blood pressure requires at least one reading of a high systolic *and* diastolic pressure.

b. False

"*High blood pressure therefore means that the patient's blood pressure remains at a figure higher than the cutoff point each time it is taken. This means that high blood pressure is not determined by one read but is based on a sustained level, which is higher than what it must be. A high systolic pressure, a high diastolic pressure, and both high systolic and diastolic pressures may determine the diagnosis of high blood pressure.*"

22. During a pancreas transplant operation,

b. the donor's duodenum is also transplanted.

"*During the operation, the patient's diseased pancreas is not removed; instead, the donor pancreas is placed in the lower right part of the abdomen. The blood vessels from the new pancreas are attached to the patient's blood vessels. As well, the donor duodenum is attached to the intestine or bladder of the patient.*"

23. Researchers have also found that by undergoing _____, patients with diabetes mellitus may reduce their risk for cardiovascular disease.

a. bariatric surgery

"*Researchers have also found that by undergoing bariatric surgery, patients with diabetes mellitus have also had a decrease in the level of risk for cardiovascular disease.*"

24. Gastric banding involves

d. banding that restricts how much food the stomach holds.

"*Gastric banding will restrict the amount of food that the stomach is able to hold and does this with a small degree of change to how the food is absorbed.*"

25. True or False: In diabetic patients who also have kidney disease, a pancreas transplant operation should not be performed at the same time as the kidney transplant because the patient's blood glucose level needs time to stabilize.

b. False

"*The duration for this surgery [pancreas transplant] is approximately three hours and is done simultaneously with a kidney transplant for diabetic patients who also have kidney disease. When combined however, the operation takes approximately six hours.*"

References Section

The References below include published works and in-text citations of published works that are intended as helpful material for your further reading.

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