MNT Of Diabetes Mellitus

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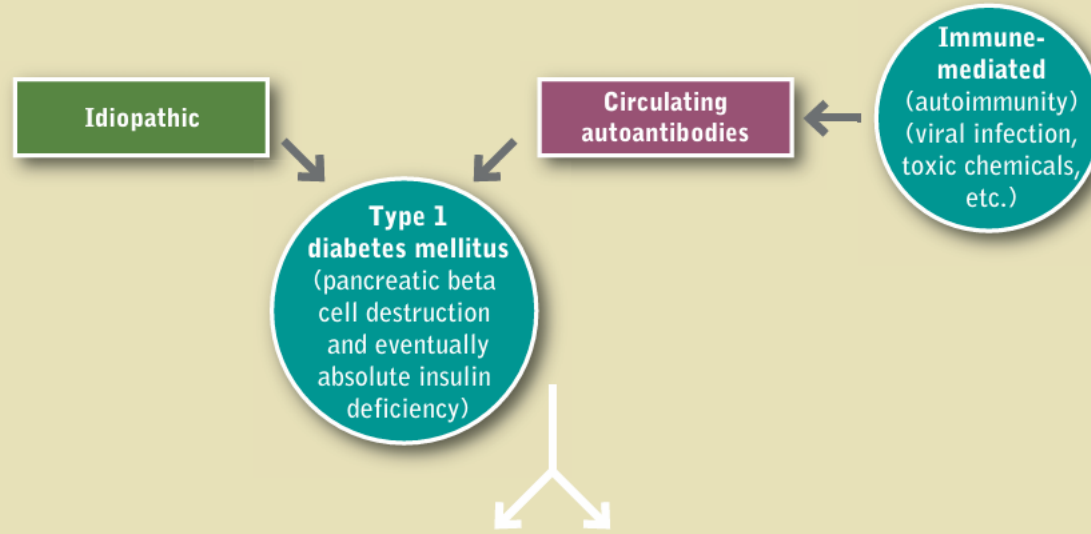
Diabetes mellitus

- Is a metabolic disorder of glucose metabolism that has many causes and forms.
- • A consistent and sound diet is a major keystone of diabetes care and control.
- • Daily self-care skills enable a person with diabetes to remain healthy and reduce risks for complications.
- • Blood glucose monitoring is a critical practice for effective glycemic control.
- • A personalized care plan that balances food intake, exercise, and insulin regulation is essential to successful diabetes management

CLASSIFICATION OF DIABETES MELLITUS AND GLUCOSE INTOLERANCE

- Various types of diabetes mellitus are classified according to the pathogenic process of the disease.

- Type 1 Diabetes Mellitus accounts for 5% to 10% of all cases of diabetes.

- It develops rapidly, and it tends to be more severe and unstable than other forms of diabetes.

Type 1 Diabetes Mellitus

Idiopathic

Circulating autoantibodies

Immune-mediated (autoimmunity) (viral infection, toxic chemicals, etc.)

Type 1 diabetes mellitus (pancreatic beta cell destruction and eventually absolute insulin deficiency)

Symptoms

- Hyperglycemia
- Excessive thirst
- Frequent urination
- Significant weight loss
- Electrolyte disturbances

Complications

Ketoacidosis
Macrovascular diseases
- Coronary heart disease
- Peripheral vascular disease
- Cerebrovascular disease

Microvascular diseases
- Retinopathy
- Nephropathy

Neuropathy

Type II DM

- Type 2 Diabetes Mellitus Approximately 90% to 95% of individuals with diabetes have type 2 diabetes.

- This form is most closely associated with lifestyle and environmental factors that lead to excess body fat, particularly in the abdominal region, and lack of physical activity.

Box 20-1 Risk Factors for Type 2 Diabetes Mellitus

Overweight (i.e., a body mass index $\geq$25 kg/m^2)
Not physically active on a regular basis
A first-degree relative with diabetes
High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, and Pacific Islander)
Women with a history of gestational diabetes or who have delivered an infant weighing $\geq$9 pounds
Hypertension ($\geq$140/90 mm Hg or on therapy for hypertension)
HDL-cholesterol level <35 mg/dL and/or triglyceride level >250 mg/dL
Woman with polycystic ovarian syndrome
HgA$_{1c}$ $\geq$5.7%
Previously identified as having impaired glucose tolerance or prediabetes
History of cardiovascular disease
Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
Age $\geq$45 years

Acanthosis nigricans

- It usually develops in skin folds, such as the back of the neck, axilla, and groin, where it presents as velvety hyper-pigmented patches with poorly defined borders.

- Acanthosis nigricans is most commonly associated with diabetes and insulin resistance, but rarely it can be a sign of internal malignancy.

- Nigricans is a strong predictor of future diabetes

How does diabetes cause acanthosis nigricans?

- Excess insulin causes skin cells to reproduce at a rapid rate.
- For people with skin that has more pigment, these new cells have more melanin.
- This increase in melanin produces a patch of skin that's darker than the skin surrounding it.
- The presence of acanthosis nigricans is a strong predictor of future diabetes.

Gestational Diabetes

- Gestational diabetes mellitus (GDM) is a form of diabetes that occurs during pregnancy, with normal blood glucose control usually recovered after delivery.

- Women who have type 1 or type 2 diabetes before conception do not fall into this category during pregnancy.

- GDM can present complications for both the mother and the fetus if it is not carefully monitored and controlled.

- Persistent hyperglycemia is associated with an increased risk of intrauterine fetal death and macrosomia.

Gestational Diabetes(Cont.)

- GDM develops in approximately 7% of all pregnant women.

- Risk factors for GDM are the same as those for type 2 diabetes.

- Pregnant women who are at high risk for diabetes should be screened with a fasting plasma glucose and glycosylated hemoglobin A1c test during the first prenatal visit.

- Women who are diagnosed with diabetes at that time are considered to have overt diabetes (usually type 2) rather than gestational diabetes.

- All women who are not otherwise known to have diabetes or who are at high risk should be screened with a glucose tolerance test between 24 and 28 weeks' gestation.

Box 20-2 | Screening and Diagnosis of GDM

"ONE-STEP" (IADPSG CONSENSUS)

Perform a 75-g OGTT, with plasma glucose measurement fasting and at 1 and 2 h, at 24 to 28 weeks of gestation in women not previously diagnosed with overt diabetes. The OGTT should be performed in the morning after an overnight fast of at least 8 hours.

The diagnosis of GDM is made when any of the following plasma glucose values are exceeded:

- Fasting: >92 mg/dL (5.1 mmol/L)
- 1 h: >180 mg/dL (10.0 mmol/L)
- 2 h: >153 mg/dL (8.5 mmol/L)

"TWO-STEP" (NIH CONSENSUS)

Perform a 50-g GLT (nonfasting), with plasma glucose measurement at 1 h (Step 1), at 24-28 weeks of gestation in women not previously diagnosed with overt diabetes. If the plasma glucose level measured 1 h after the load is ≥140 mg/dL[*] (7.8 mmol/L), proceed to 100-g OGTT (Step 2). The 100-g OGTT should be performed when the patient is fasting.

The diagnosis of GDM is made when at least two of the following four plasma glucose levels (measured fasting, 1 h, 2 h, 3 h after the OGTT) are met or exceeded:

	CARPENTER/COUSTAN	OR	NDDG
• Fasting	95 mg/dL (5.3 mmol/L)		105 mg/dL (5.8 mmol/L)
• 1 h	180 mg/dL (10.0 mmol/L)		190 mg/dL (10.6 mmol/L)
• 2 h	155 mg/dL (8.6 mmol/L)		165 mg/dL (9.2 mmol/L)
• 3 h	140 mg/dL(7.8 mmol/L)		145 mg/dL (8.0 mmol/L)

- Women with GDM have their blood glucose levels carefully monitored and are taught to follow a tightly managed program of diet and exercise and to self-test measurements of blood glucose, blood pressure, and urinary protein.

- For women who are unable to maintain blood glucose levels within an acceptable range (i.e., ≤95 mg/dL fasting, ≤180 mg/dL 1 hour postprandial, or ≤155 mg/dL 2 hours postprandial), insulin therapy is recommended.

- Oral hypoglycemic agents were not used for GDM in the past for fear of teratogenic effects.

- Women with GDM are also advised to maintain a balanced diet, a regular exercise schedule, and a healthy body mass index and to attend all follow-up visits with their physicians.

- Women with GDM are at significant risk for having subsequent pregnancies that are complicated by diabetes and for developing type 2 diabetes later in life.

- However, strict adherence to the recommended lifestyle modifications can prevent or delay the progression to type 2 diabetes

GDM Complications

- Women with gestational diabetes are at higher risk for:

- Caesarean delivery.

- Fetal birth defects.

- Stillbirth.

- Macrosomia

- Neonatal hypo glycemia.

- Additionally, these women have a 7-fold increased risk of developing type 2 diabetes later in life.

Impaired Glucose Tolerance

- Individuals whose fasting blood glucose level is higher than normal (>100 mg/dL) but less than the level for the clinical diagnosis of diabetes (≥126 mg/ dL) are defined as impaired glucose tolerance (IGT), which is also known as prediabetes.

- IGT is a strong risk factor for the future development of type 2 diabetes.

- Dietary and lifestyle treatment guidelines follow those that are designed for patients with type 2 diabetes, and can help to prevent or prolong the progression into full-blown diabetes.

- Overweight individuals with IGT can significantly reduce their risk for developing diabetes by increasing physical activity and by losing 5% to 10% of body weight.

- Aerobic exercise and resistance training are particularly important aspects of treatment because they increase insulin sensitivity and glucose utilization in skeletal muscles.

Box 20-3	Criteria for the Diagnosis of Diabetes Mellitus

- HbA_{1c} ≥6.5%. The test should be performed in a laboratory using a method that is National Glycohemoglobin Standardization Program (NGSP) certified and standardized to the Diabetes Control and Complications Trial (DCCT) assay*

  or

- Fasting plasma glucose level of ≥126 mg/dL (7.0 mmol/L)

  Fasting is defined as no caloric intake for at least 8 hours*

  or

- A 2-hour plasma glucose level of ≥200 mg/dL (11.1 mmol/L) during an oral glucose tolerance test

  The oral glucose tolerance test should be performed as described by the World Health Organization with the use of a glucose load that contains the equivalent of 75 g of anhydrous glucose dissolved in water*

  or

- In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose level of ≥200 mg/dL (11.1 mmol/L)

Table 20-3	Summary of Recommendations for Adults with Diabetes	

PARAMETER	RECOMMENDATION
Glycosylated hemoglobin A_{1c} level	<7.0%
Preprandial capillary plasma glucose level	70 to 130 mg/dL (3.9 to 7.2 mmol/L)
Peak postprandial capillary plasma glucose level*	<180 mg/dL (<10.0 mmol/L)
Blood pressure	<140/80 mm Hg[†]
Low-density lipoprotein level	<100 mg/dL (<2.6 mmol/L) for individuals without overt cardiovascular disease <70 mg/dL (<1.8 mmol/L) for individuals with overt cardiovascular disease
Triglyceride level	<150 mg/dL (<1.7 mmol/L)
High-density lipoprotein level	>40 mg/dL (>1.0 mmol/L) for men >50 mg/dL (>1.3 mmol/L) for women

Glycemic Control

- This objective seeks to keep a person relatively free from symptoms of hyperglycemia, hypoglycemia, and glycosuria, which indicate poor glycemic control.

- A number of factors are involved in supporting this goal such as pharmacology (e.g., exogenous insulin injections, oral hypoglycemic agents), diet, exercise, and monitoring.

- The consistent control of blood glucose levels helps to reduce the risks of chronic complications.

MNT

- Prediabetes Overweight and obese adults and children who have one or more additional risk factors should be tested at least once every 3 years to screen for prediabetes and diabetes.

- For individuals with prediabetes or at risk for type 2 diabetes, decrease the risk of diabetes and CVD by encouraging healthy food choices and at least 150 minutes per week of physical activity to promote and maintain a weight loss of 5% to 10% of body weight.

- Dietary patterns such as the Mediterranean diet or DASH diet would be an appropriate goal.

- Other specific recommendations are to limit saturated fat, trans fat, and sugar-sweetened beverage intake.

- Following the same MNT guidelines as provided for type 2 diabetes is recommended for individuals with prediabetes or impaired glucose tolerance (IGT).

MNT OF Diabetes

- For individuals diagnosed with diabetes, the MNT goals are as follows
- 1.Promote and support healthy eating patterns, emphasizing nutrient-dense foods and proper portion sizes.
- 2. Achieve and maintain blood glucose and lipid profiles
- 3. Achieve and maintain ideal body weight goals.
- 4. Prevent or slow the rate of development of the chronic complications of diabetes.
- 5. Individualize nutrition plans by taking into account personal and cultural preferences, health knowledge and proficiency, access to healthy foods, and willingness to make behavioral change.
- 6. Maintain the pleasure of eating by only limiting food choices when indicated by scientific evidence.
- 7. Provide practical tools for day-to-day meal planning rather than only focusing on individual nutrients or single foods.

- The Dietary Reference Intake recommendations for the Acceptable Macronutrient Distribution Range are the basic guide for planning daily food intake: 45% to 65% from carbohydrate, 20% to 35% from fat, and 10% to 35% from protein.

- The diet for any person with diabetes is always based on the normal nutrition needs of that person for positive health, with a consideration of personal preferences, metabolic goals, and schedule of meals and physical activity

Box 20-4 Nutrition Recommendations for the Management of Diabetes

CARBOHYDRATE

- A dietary pattern that includes carbohydrates from fruits, vegetables, whole grains, legumes, and dairy products is encouraged for good health.
- Monitoring carbohydrate levels—whether by carbohydrate counting, exchanges, or experienced-based estimation—remain a key strategy for the achievement of glycemic control.
- The use of low-glycemic load foods in place of higher-glycemic load foods may provide a modest additional benefit over that observed when total carbohydrate is considered alone.
- Sucrose-containing foods can be substituted for other carbohydrates in the meal plan or, if they are added to the meal plan, they must be considered with regard to the dosage of insulin or other glucose-lowering medications. Care should be taken to avoid excess energy intake.
- As for the general population, people with diabetes are encouraged to consume a variety of fiber-containing foods to meet the dietary recommendations.
- Sugar alcohols and nonnutritive sweeteners are safe when they are consumed within the daily intake levels established by the U.S. Food and Drug Administration.
- Fructose from naturally occurring foods such as fruit may result in better glycemic control compared to isocaloric intake of sucrose or starch. Avoid sugar-sweetened beverages (including those made with high-fructose corn syrup).

FAT

- The amount of dietary saturated fat, cholesterol, and trans fat recommendations are the same as those for the general population.
- Increase the selection of foods containing omega-3 fatty acids (EPA and DHA) and omega-3 linolenic acid (ALA).
- Two or more servings of fish per week (with the exception of commercially fried fish filets) provide omega-3 polyunsaturated fatty acids and are recommended.
- For people with type 2 diabetes, a Mediterranean-style, monounsaturated fatty acid–rich eating pattern may benefit glycemic control and CVD risk factors.
- Individuals with diabetes and dyslipidemia may be able to modestly reduce total and LDL-cholesterol by consuming 1.6 to 3 g/day of plant stanols or sterols typically found in enriched foods.

PROTEIN

- For individuals with diabetes and normal renal function, evidence is insufficient to suggest that usual protein intake (i.e., 15% to 20% of energy) should be modified.
- For individuals with type 2 diabetes, ingested protein can increase the insulin response without increasing plasma glucose concentrations. Therefore, carbohydrate foods that are also high in protein should not be used to prevent or treat acute hypoglycemia.

SODIUM

- For individuals with both diabetes and hypertension, a reduction in dietary sodium below the recommendations for the general public (≤2300 mg/day) is advisable.

ALCOHOL

- If adults with diabetes choose to use alcohol, daily intake should be limited to a moderate amount (i.e., one drink per day or less for women and two drinks per day or less for men).
- Be aware that alcohol consumption may place people with diabetes at increased risk for delayed hypoglycemia, especially if taking insulin or insulin secretagogues.

MICRONUTRIENTS

- No clear evidence demonstrates a benefit from vitamin or mineral supplementation in people with diabetes (as compared with the general population) who do not have underlying deficiencies.
- Routine supplementation with antioxidants (e.g., vitamins E and C, carotene), chromium, magnesium, vitamin D, or herbs is not advised because of a lack of evidence of efficacy and, in some cases, concern related to long-term safety.

Plant stanols and sterols

- Also known as phytosterols, are cholesterol-like compounds that are found naturally in a range of plant-based foods including vegetable oils, grain products such as breads and cereals, seeds, nuts, legumes, and fruits and vegetables.

- Nuts especially peanuts and its by- products of flour, oil and butter, soybeans, wheat germ, and corn oil are also good sources of sterols as well as stanols.

- Sparse evidence have suggested that a daily consumption of 1.5–2 g/day of plant sterols/stanols reduces triglycerides by 6–20% and increase high-density lipoprotein cholesterol (HDL-C) by 5–11%, but mainly in individuals with atherogenic dyslipidemia .

Common Foods Rich in Plant Sterols and Stanols

- Carrots.
- Sweet Potatoes.
- Pumpkins.
- Tomatoes.
- Apricots.
- Spinach.
- Broccoli.

Glycemic Index and Glycemic Load

- The glycemic index (GI) of food was developed to compare the physiologic effects of carbohydrates on glucose.

- The GI ranks carbohydrate foods according to how they affect blood glucose levels (for example, the GI of glucose = 100; the GI of white bread = 70).

- The estimated glycemic load (GL) of foods, meals, and dietary patterns is calculated by multiplying the GI by the amount of available carbohydrate (divided by 100) in each food and then totaling the values for all foods in a meal or dietary pattern.

- For example, two slices of white bread with a GI of 75 and 30 g of carbohydrate have a GL of 22.5 (75 × 30/100 = 22.5).

Fiber

- As for all individuals, the consumption of dietary fiber is encouraged for patients with diabetes.

- There are no reasons for these individuals to consume greater amounts of fiber than what is recommended for the general public.

- Current recommendations are to consume approximately 14 g of fiber per 1000 kcal (approximately 25 g/day for women and 38 g/day for men)

Sugar substitutes and sweeteners.

- Nutritive and nonnutritive sweeteners are safe to consume in moderation and as part of a nutritious and well-balanced diet.
- The use of nutritive sweeteners (e.g., sucrose, fructose, sorbitol) must be accounted for in a meal plan.
- Nonnutritive sweeteners do not influence the blood glucose levels.

Exercise and Glycemic Control

- For people who are using insulin, any exercise or additional physical activity must be covered in the food distribution plan.

- The following guidelines are recommended for regulating the glycemic response to exercise in individuals with diabetes who use insulin

- 1. Achieve metabolic control before physical activity.

- • In the presence of hyperglycemia: use caution if glucose levels are elevated and if no ketosis is present; avoid vigorous physical activity if ketosis is present.

- . • Ingest added carbohydrate if glucose levels are less than 100 mg/dL.

Exercise and Glycemic Control

- 2. Monitor blood glucose levels before and after physical activity.
- • Identify when changes in insulin or food intake are necessary.
- • Learn the glycemic response to different physical activity conditions.
- 3. Monitor food and fluid intake.
- • Consume added carbohydrate as needed to avoid hypoglycemia .
- • Carbohydrate-based foods should be readily available during and after physical activity.
- • Ensure adequate fluid intake.

Table 20-7 Dietary Strategies for Type 1 and Type 2 Diabetes Mellitus

DIETARY STRATEGY	TYPE 1	TYPE 2
Decrease energy intake (kilocalories)	No	Yes, if weight loss is recommended
Increase frequency of feedings	Sometimes	Usually no
Have regular daily intake of kilocalories from carbohydrate, protein, and fat	Very important	Yes
Plan consistent daily ratio of protein, carbohydrate, and fat for each feeding	Desirable	Yes, but not as tightly controlled
Use extra or planned food to treat or prevent hypoglycemia	Very important	Usually not necessary
Plan regular times for meals and snacks	Very important	Yes
Use extra food for unusual exercise	Yes	Usually not necessary
During illness, use small, frequent feedings of carbohydrates to prevent starvation ketoacidosis	Important	Usually not necessary because of resistance to ketoacidosis

Food exchange system

- With this system, commonly used foods are grouped into exchange lists according to roughly equal portions based on macronutrient values.

- A standard serving of a carbohydrate food (e.g., bread, cereal, legumes, starchy vegetables) has 15 grams of carbohydrates.

- A serving of fruit or a serving of sweets or desserts would also contain 15 grams of carbohydrates.

- Dairy products have 12 grams of carbohydrates per serving.

- Non starchy vegetables all have 5 grams of carbohydrates per serving.

- The exchange list also has defined portions based on macronutrient content for meat and meat substitutes, fats, and alcohol.

- The food exchange system includes six gro of food, each group of foods are placed in a food exchange list. The food exchange lists are: **Fruits, Vegetables, Milk, Starches, Fats, Meats and Meat Substitutes.** The foods in each individual group have a similar amount of calories and nutrients such as carbohydrates, fat and protein.

1500 Calories	Starch	Meat	Vegetable	Fruit	Fat	Milk
Breakfast	2	2	-	1	1	1
snack	1	-	1	-	-	-
Lunch	2	1	-	1	1	-
snack	-	-	1	1	-	-
Dinner	3	2	1	-	1	1

- Some foods in the exchange system are considered free.
- Any food or drink that has less than 20 calories and 5 grams or less of carbohydrate a serving is considered a free food.

- FREE

- Many foods are made up of more than one food category, so they will not fall nicely in just one of the exchange lists. These types of foods are known as "combination foods".

Vegetable Group

- 3 g carbohydrate
- 1 g protein
- 0 g fat
- 16 Calories
- Examples:
    - ½ Cup cooked spinach
    - 1 Cup baby carrots
    - 1 Cup diced tomatoes
    - 1 Cup cucumbers

Fruit Group

- 10 g carbohydrate
- 0 g protein
- 0 g fat
- 40 Calories
- Examples:
  - 1 small banana
  - 1 ¼ Cups strawberries
  - ½ Cup orange juice
  - ¾ Cup fresh pineapple

PLAN DE 30 DÍAS DE ALIMENTACIÓN

Milk Group

CLASSIFICATION	CARBOHYDRATE	PROTEIN	FAT	ENERGY
Whole	12 g	8 g	10 g	170 kcal
Low Fat	12 g	8 g	5 g	125 kcal
Skimmed/Non-fat/Fat-free	12 g	8 g	-	80 kcal

Examples:
- 1 Cup non-fat milk
- 1 Cup soy milk
- 2/3 Cup fat-free, artificially sweetened yogurt

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Starch Group

CLASSIFICATION	CARBOHYDRATE	PROTEIN	FAT	ENERGY
Rice A – Low Protein	23 g	-	-	92 kcal
Rice B – Medium Protein	23 g	2 g	-	100 kcal
Rice C – High Protein	23 g	4 g	-	108 kcal

Examples:
- ½ Cup oatmeal
- 1 Avg. slice bread
- ½ Hamburger bun
- ½ Cup corn/peas

HEALTHIE sources of STARCHY CARBS
Sweet Potato
Quinoa
White Beans
Oats
Butternut Squash
Pumpkin

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Meat/Meat Substitutes

CLASSIFICATION	CARBOHYDRATE	PROTEIN	FAT	ENERGY
Low Fat	-	8 g	1 g	41 kcal
Medium	-	8 g	6 g	86 kcal
High Fat	-	8 g	10 g	122 kcal

Examples:
- ¼ Cup egg substitutes;
- white meat poultry,
- no skin1 oz lean cut beef
- 1 egg; poultry w/skin, fried fish
- 1 oz of most cheeses, sausages;

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Fat Group

- 0 g carbohydrate
- 0 g protein
- 5 g fat
- 45 Calories
- Examples:
    - 1 tsp oil
    - ½ Tbsp peanut butter
    - 1 Tbsp reduced-fat mayo
    - 1 Tbsp cream cheese
    - Avacado

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Sugar Group:

- 5 g carbohydrate
- 0 g protein
- 0 g fat
- 20 Calories

Illness.

- Illnesses can complicate diet management and blood glucose control.
- As such, it is recommended that individuals with diabetes receive an annual influenza vaccine, along with other preventive vaccines as indicated (e.g., pneumococcal polysaccharide vaccine, hepatitis B vaccines).
- When general illness occurs, food and insulin should be adjusted accordingly.
- The texture of the food can be modified to make use of easily digested and absorbed liquid foods.

- In general, people with diabetes who are experiencing short-term illness (e.g., cold, flu, vomiting, diarrhea) should do the following:
- • Monitor the blood glucose level frequently. Fever, infection, or stress hormones can raise blood glucose levels.
- • Administer supplemental insulin as indicated by blood glucose level.
- • Monitor urine for ketones, a sign of diabetic keto acidosis (DKA).
- • Maintain food and fluid intake. Fluids, carbohydrates, and electrolytes must be replaced.
- Liquid or soft foods may replace carbohydrate-containing solid foods if necessary.
- • Contact a physician if the illness lasts for more than 24 hours, if the fever remains high, or if blood glucose concentration remains ≥250 mg/dL and moderate to large ketone levels are present.

Stress.

- Physiologic or psychosocial stress may affect glycemic control in patients with diabetes because of the hormonal responses that are antagonistic to insulin.

- In particular, diabetes-specific emotional stress is associated with poor HbA1c control in individuals with type 1 and type 2 diabetes.

- People with diabetes, especially those who use insulin, should learn useful stress-reduction exercises and activities as part of their self-care skills and practices.

- Stress-reducing activities can vary greatly from one person to the next (e.g., meditation, running, yoga, journaling, playing music).

- Finding the best coping mechanism may require trial and error.