DIABETES MELLITUS/DIABETIC KETOACIDOSIS

Diabetes affects 18% of people over the age of 65, and approximately 625,000 new cases of diabetes are diagnosed annually in the general population. Conditions or situations known to exacerbate glucose/insulin imbalance include (1) previously undiagnosed or newly diagnosed type 1 diabetes; (2) food intake in excess of available insulin; (3) adolescence and puberty; (4) exercise in uncontrolled diabetes; and (5) stress associated with illness, infection, trauma, or emotional distress. Type 1 diabetes can be complicated by instability and diabetic ketoacidosis (DKA). DKA is a life-threatening emergency caused by a relative or absolute deficiency of insulin.

CARE SETTING

Although DKA may be encountered in any setting and mild DKA may be managed at the community level, severe metabolic imbalance requires inpatient acute care on a medical unit.

RELATED CONCERNS

Amputation
Fluid and electrolyte imbalances
Metabolic acidosis (primary base bicarbonate deficit)
Psychosocial aspects of care

Patient Assessment Database

Data depend on the severity and duration of metabolic imbalance, length/stage of diabetic process, and effects on other organ function.

ACTIVITY/REST

May report: Sleep/rest disturbances
Weakness, fatigue, difficulty walking/moving
Muscle cramps, decreased muscle strength

May exhibit: Tachycardia and tachypnea at rest or with activity
Lethargy/disorientation, coma
Decreased muscle strength/tone

CIRCULATION

May report: History of hypertension; acute myocardial infarction (MI)
Claudication, numbness, tingling of extremities (long-term effects)
Leg ulcers, slow healing

May exhibit: Tachycardia
Postural BP changes; hypertension
Decreased/absent pulses
Dysrhythmias
Crackles; jugular venous distension (JVD) (if heart failure [HF] present)
Hot, dry, flushed skin; sunken eyeballs

EGO INTEGRITY

May report: Stress; dependence on others
Life stressors including financial concerns related to condition

May exhibit: Anxiety, irritability

ELIMINATION

May report: Change in usual voiding pattern (polyuria), nocturia
Pain/burning, difficulty voiding (infection), recent/recurrent urinary tract infection (UTI)
Abdominal tenderness, bloating
Diarrhea

May exhibit: Pale, yellow, dilute urine; polyuria (may progress to oliguria/anuria if severe hypovolemia occurs)
Cloudy, odorous urine (infection)
Abdomen firm, distented
Bowel sounds diminished or hyperactive (diarrhea)

FOOD/FLUID

May report: Loss of appetite; nausea/vomiting
Not following diet; increased intake of glucose/carbohydrates
Weight loss over a period of days/weeks
Thirst
Use of medications exacerbating dehydration, such as diuretics

May exhibit: Dry/cracked skin, poor skin turgor
Abdominal rigidity/distension
Thyroid may be enlarged (increased metabolic needs with increased blood sugar)
Halitosis/sweet, fruity odor (acetone breath)

NEUROSENSORY

May report: Fainting spells/dizziness
Headaches
Tingling, numbness, weakness in muscles
Visual disturbances

May exhibit: Confusion/disorientation; drowsiness, lethargy, stupor/coma (later stages)
Memory impairment (recent, remote)
Deep tendon reflexes (DTRs) decreased (coma)
Seizure activity (late stages of DKA or hypoglycemia)

PAIN/DISCOMFORT

May report: Abdominal bloating/pain (mild/severe)

May exhibit: Facial grimacing with palpation; guarding

RESPIRATION

May report: Air hunger (late stages of DKA)
Cough, with/without purulent sputum (infection)

May exhibit: Increased respiratory rate (tachypnea); deep, rapid (Kussmaul's) respirations (metabolic acidosis)
Rhonchi, wheezes
Yellow or green sputum (infection)

SAFETY

May report: Dry, itching skin; skin ulcerations
Paresthesia (diabetic neuropathy)

May exhibit: Fever, diaphoresis
Skin breakdown, lesions/ulcerations
Decreased general strength/ROM
Weakness/paralysis of muscles, including respiratory musculature (if potassium levels are markedly decreased)

SEXUALITY

May report: Vaginal discharge (prone to infection)
Problems with impotence (men); orgasmic difficulty (women)

TEACHING/LEARNING

May report: Familial risk factors: diabetes mellitus (DM), heart disease, strokes, hypertension
Slow/delayed healing
Use of drugs, e.g., steroids, thiazide diuretics, phenytoin (Dilantin), and phenobarbital (can increase glucose levels)

May/may not be taking diabetic medications as ordered

Discharge plan considerations: **DRG projected mean length of inpatient stay: 5.9 days**

May need assistance with dietary regimen, medication administration/supplies, self-care, glucose monitoring

Refer to section at end of plan for postdischarge considerations.

DIAGNOSTIC STUDIES

Serum glucose: Increased 200–1000 mg/dL or more.

Serum acetone (ketones): Strongly positive.

Fatty acids: Lipids, triglycerides, and cholesterol level elevated.

Serum osmolality: Elevated but usually less than 330 mOsm/L.

Glucagon: Elevated level is associated with conditions that produce (1) actual hypoglycemia, (2) relative lack of glucose (e.g., trauma, infection), or (3) lack of insulin. Therefore, glucagon may be elevated with severe DKA despite hyperglycemia.

Glycosylated hemoglobin (HbA_{1C}): Evaluates glucose control during past 8–12 wk with the previous 2 wk most heavily weighted. Useful in differentiating inadequate control versus incident-related DKA (e.g., current upper respiratory infection [URI]). A result greater than 8% represents an average blood glucose of 200 mg/dL and signals a need for changes in treatment.

Serum insulin: May be decreased/absent (type 1) or normal to high (type 2), indicating insulin insufficiency/improper utilization (endogenous/exogenous). Insulin resistance may develop secondary to formation of antibodies.

Electrolytes:

Sodium: May be normal, elevated, or decreased.

Potassium: Normal or falsely elevated (cellular shifts), then markedly decreased.

Phosphorus: Frequently decreased.

Arterial blood gases (ABGs): Usually reflects low pH and decreased HCO_3 (metabolic acidosis) with compensatory respiratory alkalosis.

CBC: Hct may be elevated (dehydration); leukocytosis suggest hemoconcentration, response to stress or infection.

BUN: May be normal or elevated (dehydration/decreased renal perfusion).

Serum amylase: May be elevated, indicating acute pancreatitis as cause of DKA.

Thyroid function tests: Increased thyroid activity can increase blood glucose and insulin needs.

Urine: Positive for glucose and ketones; specific gravity and osmolality may be elevated.

Cultures and sensitivities: Possible UTI, respiratory or wound infections.

NURSING PRIORITIES

1. Restore fluid/electrolyte and acid-base balance.
2. Correct/reverse metabolic abnormalities.
3. Identify/assist with management of underlying cause/disease process.
4. Prevent complications.
5. Provide information about disease process/prognosis, self-care, and treatment needs.

DISCHARGE GOALS

1. Homeostasis achieved.
2. Causative/precipitating factors corrected/controlled.
3. Complications prevented/minimized.
4. Disease process/prognosis, self-care needs, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

NURSING DIAGNOSIS: Fluid Volume deficient [specify]

May be related to

Osmotic diuresis (from hyperglycemia)
Excessive gastric losses: diarrhea, vomiting
Restricted intake: nausea, confusion

Possibly evidenced by

Increased urinary output, dilute urine
Weakness; thirst; sudden weight loss
Dry skin/mucous membranes, poor skin turgor
Hypotension, tachycardia, delayed capillary refill

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Fluid Balance (NOC)

Demonstrate adequate hydration as evidenced by stable vital signs, palpable peripheral pulses, good skin turgor and capillary refill, individually appropriate urinary output, and electrolyte levels within normal range.

ACTIONS/INTERVENTIONS	RATIONALE
Fluid/Electrolyte Management (NIC)	
Independent	
Obtain history from patient/SO related to duration/intensity of symptoms such as vomiting, excessive urination.	Assists in estimation of total volume depletion. Symptoms may have been present for varying amounts of time (hours to days). Presence of infectious process results in fever and hypermetabolic state, increasing insensible fluid losses.
Monitor vital signs:	
Note orthostatic BP changes;	Hypovolemia may be manifested by hypotension and tachycardia. Estimates of severity of hypovolemia may be made when patient’s systolic BP drops more than 10 mm Hg from a recumbent to a sitting/standing position. *Note:* Cardiac neuropathy may block reflexes that normally increase heart rate.
Respiratory pattern, e.g., Kussmaul’s respirations, acetone breath;	Lungs remove carbonic acid through respirations, producing a compensatory respiratory alkalosis for ketoacidosis. Acetone breath is due to breakdown of acetoacetic acid and should diminish as ketosis is corrected.
Respiratory rate and quality; use of accessory muscles, periods of apnea, and appearance of cyanosis;	Correction of hyperglycemia and acidosis will cause the respiratory rate and pattern to approach normal. In contrast, increased work of breathing; shallow, rapid respirations; and presence of cyanosis may indicate respiratory fatigue and/or that patient is losing ability to compensate for acidosis.
Temperature, skin color/moisture.	Although fever, chills, and diaphoresis are common with infectious process, fever with flushed, dry skin may reflect dehydration.

ACTIONS/INTERVENTIONS	RATIONALE
Fluid/Electrolyte Management (NIC)	
Independent	
Assess peripheral pulses, capillary refill, skin turgor, and mucous membranes.	Indicators of level of hydration, adequacy of circulating volume.
Monitor I&O; note urine specific gravity.	Provides ongoing estimate of volume replacement needs, kidney function, and effectiveness of therapy.
Weigh daily.	Provides the best assessment of current fluid status and adequacy of fluid replacement.
Maintain fluid intake of at least 2500 mL/day within cardiac tolerance when oral intake is resumed.	Maintains hydration/circulating volume.
Promote comfortable environment. Cover patient with light sheets.	Avoids overheating, which could promote further fluid loss.
Investigate changes in mentation/sensorium.	Changes in mentation can be due to abnormally high or low glucose, electrolyte abnormalities, acidosis, decreased cerebral perfusion, or developing hypoxia. Regardless of the cause, impaired consciousness can predispose patient to aspiration.
Collaborative	
Administer fluids as indicated:	
Isotonic (0.9%) or lactated Ringer’s solution without additives;	Type and amount of fluid depend on degree of deficit and individual patient response. *Note:* Patients with DKA often severely dehydrated and commonly need 5–10 L of isotonic saline (2–3 L within first 2 hr of treatment).
Albumin, plasma, dextran.	Plasma expanders may occasionally be needed if the deficit is life-threatening/BP does not normalize with rehydration efforts.
Insert/maintain indwelling urinary catheter.	Provides for accurate/ongoing measurement of urinary output, especially if autonomic neuropathies result in neurogenic bladder (urinary retention/overflow incontinence). May be removed when patient is stable to reduce risk of infection.
Monitor laboratory studies, e.g.:	
Hct;	Assesses level of hydration and is often elevated because of hemoconcentration associated with osmotic diuresis.
BUN/creatinine (Cr);	Elevated values may reflect cellular breakdown from dehydration or signal the onset of renal failure.
Serum osmolality;	Elevated because of hyperglycemia and dehydration.

ACTIONS/INTERVENTIONS	RATIONALE
Fluid/Electrolyte Management (NIC)	
Collaborative	
Sodium;	May be decreased, reflecting shift of fluids from the intracellular compartment (osmotic diuresis). High sodium values reflect severe fluid loss/dehydration or sodium reabsorption in response to aldosterone secretion.
Potassium.	Initially, hyperkalemia occurs in response to metabolic acidosis, but as this potassium is lost in the urine, the absolute potassium level in the body is depleted. As insulin is replaced and acidosis is corrected, serum potassium deficit becomes apparent.
Administer potassium and other electrolytes via IV and/or by oral route as indicated.	Potassium should be added to the IV (as soon as urinary flow is adequate) to prevent hypokalemia. *Note:* Potassium phosphate may be drug of choice when IV fluids contain sodium chloride in order to prevent chloride overload.
Administer bicarbonate if pH is less than 7.1.	Given with caution to help correct acidosis in the presence of hypotension or shock, lactic acidosis, or severe hyperkalemia.
Insert NG tube and attach to suction as indicated.	Decompresses stomach and may relieve vomiting.

NURSING DIAGNOSIS: Nutrition: imbalanced, less than body requirements

May be related to

Insulin deficiency (decreased uptake and utilization of glucose by the tissues, resulting in increased protein/fat metabolism)
Decreased oral intake: anorexia, nausea, gastric fullness, abdominal pain; altered consciousness
Hypermetabolic state: release of stress hormones (e.g., epinephrine, cortisol, and growth hormone), infectious process

Possibly evidenced by

Increased urinary output, dilute urine
Reported inadequate food intake, lack of interest in food
Recent weight loss; weakness, fatigue, poor muscle tone
Diarrhea
Increased ketones (end product of fat metabolism)

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Nutritional Status (NOC)

Ingest appropriate amounts of calories/nutrients.
Display usual energy level.
Demonstrate stabilized weight or gain toward usual/desired range with normal laboratory values.

ACTIONS/INTERVENTIONS	RATIONALE
Hyperglycemia Management (NIC)	
Independent	
Weigh daily or as indicated.	Assesses adequacy of nutritional intake (absorption and utilization).
Ascertain patient's dietary program and usual pattern; compare with recent intake.	Identifies deficits and deviations from therapeutic needs.
Auscultate bowel sounds. Note reports of abdominal pain/bloating, nausea, vomiting of undigested food. Maintain nothing by mouth (NPO) status as indicated.	Hyperglycemia and fluid and electrolyte disturbances can decrease gastric motility/function (distension or ileus), affecting choice of interventions. *Note:* Long-term difficulties with decreased gastric emptying and poor intestinal motility suggest autonomic neuropathies affecting the GI tract and requiring symptomatic treatment.
Provide liquids containing nutrients and electrolytes as soon as patient can tolerate oral fluids; progress to more solid food as tolerated.	Oral route is preferred when patient is alert and bowel function is restored.
Identify food preferences, including ethnic/cultural needs.	If patient's food preferences can be incorporated into the meal plan, cooperation with dietary requirements may be facilitated after discharge.
Include SO in meal planning as indicated.	Promotes sense of involvement; provides information for SO to understand nutritional needs of patient. *Note:* Various methods available or dietary planning include exchange list, point system, glycemic index, or preselected menus.
Observe for signs of hypoglycemia, e.g., changes in level of consciousness, cool/clammy skin, rapid pulse, hunger, irritability, anxiety, headache, lightheadedness, shakiness.	Once carbohydrate metabolism resumes (blood glucose level reduced) and as insulin is being given, hypoglycemia can occur. If patient is comatose, hypoglycemia may occur without notable change in level of consciousness (LOC). This potentially life-threatening emergency should be assessed and treated quickly per protocol. *Note:* Type 1 diabetics of long standing may not display usual signs of hypoglycemia because normal response to low blood sugar may be diminished.
Collaborative	
Perform fingerstick glucose testing.	Bedside analysis of serum glucose is more accurate (displays current levels) than monitoring urine sugar, which is not sensitive enough to detect fluctuations in serum levels and can be affected by patient's individual renal threshold or the presence of urinary retention/renal failure. *Note:* Some studies have found that a urine glucose of 20% may be correlated to a blood glucose of 140–360 mg/dL.

ACTIONS/INTERVENTIONS	RATIONALE
Hyperglycemia Management (NIC)	
Collaborative	
Monitor laboratory studies, e.g., serum glucose, acetone, pH, HCO_3.	Blood glucose will decrease slowly with controlled fluid replacement and insulin therapy. With the administration of optimal insulin dosages, glucose can then enter the cells and be used for energy. When this happens, acetone levels decrease and acidosis is corrected.
Administer regular insulin by intermittent or continuous IV method, e.g., IV bolus followed by a continuous drip via pump of approximately 5–10 U/hr so that glucose is reduced by 50 mg/dL/hr.	Regular insulin has a rapid onset and thus quickly helps move glucose into cells. The IV route is the initial route of choice because absorption from subcutaneous tissues may be erratic. Many believe the continuous method is the optimal way to facilitate transition to carbohydrate metabolism and reduce incidence of hypoglycemia.
Administer glucose solutions, e.g., dextrose and half-normal saline.	Glucose solutions may be added after insulin and fluids have brought the blood glucose to approximately 400 mg/dL. As carbohydrate metabolism approaches normal, care must be taken to avoid hypoglycemia.
Consult with dietitian for initiation of resumption of oral intake.	Useful in calculating and adjusting diet to meet patient's needs; answer questions and assist patient/SO in developing meal plans.
Provide diet of approximately 60% carbohydrates, 20% proteins, 20% fats in designated number of meals/snacks.	Complex carbohydrates (e.g., corn, peas, carrots, broccoli, dried beans, oats, apples) decrease glucose levels/insulin needs, reduce serum cholesterol levels, and promote satiation. Food intake is scheduled according to specific insulin characteristics (e.g., peak effect) and individual patient response. *Note:* A snack at bedtime (hs) of complex carbohydrates is especially important (if insulin is given in divided doses) to prevent hypoglycemia during sleep and potential Somogyi response.
Administer other medications as indicated, e.g., metoclopramide (Reglan); tetracycline.	May be useful in treating symptoms related to autonomic neuropathies affecting GI tract, thus enhancing oral intake and absorption of nutrients.

NURSING DIAGNOSIS: Infection, risk for [sepsis]

Risk factors may include

High glucose levels, decreased leukocyte function, alterations in circulation
Preexisting respiratory infection, or UTI

Possibly evidenced by

[Not applicable; presence of signs and symptoms establishes an *actual* diagnosis.]

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Knowledge: Infection Control (NOC)

Identify interventions to prevent/reduce risk of infection.
Demonstrate techniques, lifestyle changes to prevent development of infection.

ACTIONS/INTERVENTIONS	RATIONALE
Infection Control (NIC)	
Independent	
Observe for signs of infection and inflammation, e.g., fever, flushed appearance, wound drainage, purulent sputum, cloudy urine.	Patient may be admitted with infection, which could have precipitated the ketoacidotic state, or may develop a nosocomial infection.
Promote good handwashing by staff and patient.	Reduces risk of cross-contamination.
Maintain aseptic technique for IV insertion procedure, administration of medications, and providing maintenance/site care. Rotate IV sites as indicated.	High glucose in the blood creates an excellent medium for bacterial growth.
Provide catheter/perineal care. Teach the female patient to clean from front to back after elimination.	Minimizes risk of UTI. Comatose patient may be at particular risk if urinary retention occurred before hospitalization. *Note:* Elderly female diabetic patients are especially prone to urinary tract/vaginal yeast infections.
Provide conscientious skin care; gently massage bony areas. Keep the skin dry, linens dry and wrinkle-free.	Peripheral circulation may be impaired, placing patient at increased risk for skin irritation/breakdown and infection.
Auscultate breath sounds.	Rhonchi indicate accumulation of secretions possibly related to pneumonia/bronchitis (may have precipitated the DKA). Pulmonary congestion/edema (crackles) may result from rapid fluid replacement/HF.
Place in semi-Fowler's position.	Facilitates lung expansion; reduces risk of aspiration.
Reposition and encourage coughing/deep breathing if patient is alert and cooperative. Otherwise, suction airway, using sterile technique, as needed.	Aids in ventilating all lung areas and mobilizing secretions. Prevents stasis of secretions with increased risk of infection.
Provide tissues and trash bag in a convenient location for sputum and other secretions. Instruct patient in proper handling of secretions.	Minimizes spread of infection.
Encourage/assist with oral hygiene.	Reduces risk of oral/gum disease.
Encourage adequate dietary and fluid intake (approximately3000 mL/day if not contraindicated by cardiac or renal dysfunction), including 8 oz of cranberry juice per day as appropriate.	Decreases susceptibility to infection. Increased urinary flow prevents stasis and aids in maintaining urine pH/acidity, reducing bacteria growth and flushing organisms out of system. *Note:* Use of cranberry juice can help prevent bacteria from adhering to the bladder wall, reducing the risk of recurrent UTI.
Collaborative	
Obtain specimens for culture and sensitivities as indicated.	Identifies organism(s) so that most appropriate drug therapy can be instituted.
Administer antibiotics as appropriate.	Early treatment may help prevent sepsis.

NURSING DIAGNOSIS: Sensory Perception, risk for disturbed (specify)

Risk factors may include

Endogenous chemical alteration: glucose/insulin and/or electrolyte imbalance

Possibly evidenced by

[Not applicable; presence of signs and symptoms establishes and *actual* diagnosis.]

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Neurological Status (NOC)

Maintain usual level of mentation.

Recognize and compensate for existing sensory impairments.

ACTIONS/INTERVENTIONS	RATIONALE
Neurological Monitoring (NIC)	
Independent	
Monitor vital signs and mental status.	Provides a baseline from which to compare abnormal findings, e.g., fever may affect mentation.
Address patient by name; reorient as needed to place, person, and time. Give short explanations, speaking slowly and enunciating clearly.	Decreases confusion and helps maintain contact with reality.
Schedule nursing time to provide for uninterrupted rest periods.	Promotes restful sleep, reduces fatigue, and may improve cognition.
Keep patient's routine as consistent as possible. Encourage participation in activities of daily living (ADLs) as able.	Helps keep patient in touch with reality and maintain orientation to the environment.
Protect patient from injury (avoid/limit use of restraints as able) when level of consciousness is impaired. Place bed in low position. Pad bed rails and provide soft airway if patient is prone to seizures.	Disoriented patient is prone to injury, especially at night, and precautions need to be taken as indicated. Seizure precautions need to be taken as appropriate to prevent physical injury, aspiration.
Evaluate visual acuity as indicated.	Retinal edema/detachment, hemorrhage, presence of cataracts or temporary paralysis of extraocular muscles may impair vision, requiring corrective therapy and/or supportive care.
Investigate reports of hyperesthesia, pain, or sensory loss in the feet/legs. Look for ulcers, reddened areas, pressure points, loss of pedal pulses.	Peripheral neuropathies may result in severe discomfort, lack of/distortion of tactile sensation, potentiating risk of dermal injury and impaired balance. *Note:* Mononeuropathy affects a single nerve (most often femoral or cranial), causing sudden pain and loss of motor/sensory function along affected nerve path.

ACTIONS/INTERVENTIONS	RATIONALE

Neurological Monitoring (NIC)	
Independent	
Provide bed cradle. Keep hands/feet warm, avoiding exposure to cool drafts/hot water or use of heating pad.	Reduces discomfort and potential for dermal injury. *Note:* Sudden development of cold hands/feet may reflect hypoglycemia, suggesting need to evaluate serum glucose level.
Assist with ambulation/position changes.	Promotes patient safety, especially when sense of balance is affected.
Collaborative	
Carry out prescribed regimen for correcting DKA as indicated.	Alteration in thought processes/potential for seizure activity is usually alleviated once hyperosmolar state is corrected.
Monitor laboratory values, e.g., blood glucose, serum osmolality, Hb/Hct, BUN/Cr.	Imbalances can impair mentation. *Note:* If fluid is replaced too quickly, excess water may enter brain cells and cause alteration in the level of consciousness (water intoxication).

NURSING DIAGNOSIS: Fatigue

May be related to

Decreased metabolic energy production
Altered body chemistry: insufficient insulin
Increased energy demands: hypermetabolic state/infection

Possibly evidenced by

Overwhelming lack of energy, inability to maintain usual routines, decreased performance, accident-prone
Impaired ability to concentrate, listlessness, disinterest in surroundings

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL

Endurance (NOC)

Verbalize increase in energy level.
Display improved ability to participate in desired activities.

ACTIONS/INTERVENTIONS	RATIONALE
Energy Management (NIC)	
Independent	
Discuss with patient the need for activity. Plan schedule with patient and identify activities that lead to fatigue.	Education may provide motivation to increase activity level even though patient may feel too weak initially.
Alternate activity with periods of rest/uninterrupted sleep.	Prevents excessive fatigue.
Monitor pulse, respiratory rate, and BP before/after activity.	Indicates physiological levels of tolerance.
ACTIONS/INTERVENTIONS	RATIONALE
Energy Management (NIC)	

Independent	
Discuss ways of conserving energy while bathing, transferring, and so on.	Patient will be able to accomplish more with a decreased expenditure of energy.
Increase patient participation in ADLs as tolerated.	Increases confidence level/self-esteem and tolerance level. *Note:* Elderly patients may experience a "lag effect" in which exercise may precipitate hypoglycemia as late as 24 hr after exercising, leading to extensive fatigue and muscle tremors.

NURSING DIAGNOSIS: Powerlessness

May be related to

Long-term/progressive illness that is not curable
Dependence on others

Possibly evidenced by

Reluctance to express true feelings; expressions of having no control/influence over situation
Apathy, withdrawal, anger
Does not monitor progress, nonparticipation in care/decision making
Depression over physical deterioration/complications despite patient cooperation with regimen

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Health Beliefs: Perceived Control (NOC)

Acknowledge feelings of helplessness.
Identify healthy ways to deal with feelings.
Assist in planning own care and independently take responsibility for self-care activities.

ACTIONS/INTERVENTIONS	RATIONALE
Self-Responsibility Facilitation (NIC)	
Independent	
Encourage patient/SO to express feelings about hospitalization and disease in general.	Identifies concerns and facilitates problem solving.
Acknowledge normality of feelings.	Recognition that reactions are normal can help patient problem-solve and seek help as needed. Diabetic control is a full-time job that serves as a constant reminder of both presence of disease and threat to patient's health/life.
Assess how patient has handled problems in the past. Identify locus of control.	Knowledge of individual's style helps determine needs for treatment goals. Patient whose locus of control is internal usually looks at ways to gain control over own treatment program. Patient who operates with an external locus of control wants to be cared for by others and may project blame for circumstances onto external factors.

ACTIONS/INTERVENTIONS	RATIONALE
Self-Responsibility Facilitation (NIC)	

Independent	
Provide opportunity for SO to express concerns and discuss ways in which he or she can be helpful to patient.	Enhances sense of being involved and gives SO a chance to problem-solve solutions to help patient prevent recurrence.
Ascertain expectations/goals of patient and SO.	Unrealistic expectations/pressure from others or self may result in feelings of frustration/loss of control and may impair coping abilities. *Note:* Even with rigid adherence to medical regimen, complications/setbacks may occur.
Determine whether a change in relationship with SO has occurred.	Constant energy and thought required for diabetic control often shifts the focus of a relationship. Development of psychological concerns/visceral neuropathies affecting self-concept (especially sexual role function) may add further stress.
Encourage patient to make decisions related to care, e.g., ambulation, time for activities, and so forth.	Communicates to patient that some control can be exercised over care.
Support participation in self-care and give positive feedback for efforts.	Promotes feeling of control over situation.

NURSING DIAGNOSIS: Knowledge, deficient [Learning Need] regarding disease, prognosis, treatment, self-care, and discharge needs

May be related to

Lack of exposure/recall, information misinterpretation
Unfamiliarity with information resources

Possibly evidenced by

Questions/request for information, verbalization of the problem
Inaccurate follow-through of instructions, development of preventable complications

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Knowledge: Diabetes Management (NOC)

Verbalize understanding of disease process, potential complications.
Identify relationship of signs/symptoms to the disease process and correlate symptoms with causative factors.
Correctly perform necessary procedures and explain reasons for the actions.
Initiate necessary lifestyle changes and participate in treatment regimen.

ACTIONS/INTERVENTIONS	RATIONALE
Learning Facilitation (NIC)	

Independent Create an environment of trust by listening to concerns, being available.	Rapport and respect need to be established before patient will be willing to take part in the learning process.
Work with patient in setting mutual goals for learning.	Participation in the planning promotes enthusiasm and cooperation with the principles learned.
Select a variety of teaching strategies, e.g., demonstrate needed skills and have patient do return demonstration, incorporate new skills into the hospital routine.	Use of different means of accessing information promotes learner retention.
Teaching: Disease Process (NIC)	
Discuss essential elements, e.g: What the normal blood glucose range is and how it compares with patient's level, the type of DM patient has, the relationship between insulin deficiency and a high glucose level;	Provides knowledge base from which patient can make informed lifestyle choices.
Reasons for the ketoacidotic episode;	Knowledge of the precipitating factors may help avoid recurrences.
Acute and chronic complications of the disease, including visual disturbances, neurosensory and cardiovascular changes, renal impairment/hypertension.	Awareness helps patient be more consistent with care and may prevent/delay onset of complications.
Demonstrate fingerstick testing, or similar monitoring system, and have patient/SO return demonstration until proficient. Instruct patient to check urine ketones if glucose is higher than 250 mg/dL.	Self-monitoring of blood glucose four or more times a day allows flexibility in self-care, promotes tighter control of serum levels (e.g., 60–150 mg/dL), and may prevent/delay development of long-term complications. *Note:* Various new devices have been released or are in testing. Some use a laser perforator instead of a sharp lancet, others are bloodless. In addition to glucose levels, several devices can measure glocosylated albumin (fructosamine) in the home, providing a measure of blood glucose control over the past 7–10 days.
Discuss dietary plan, limiting intake of sugar, fat, salt, and alcohol; eating complex carbohydrates, especially those high in fiber (fruits, vegetables, whole grains); and ways to deal with meals outside the home.	Medical nutrition therapy for diabetes encourages patient to make meal choices based on individual unique needs and preferences. Awareness of importance of dietary control aids patient in planning meals/sticking to regimen. Fiber can slow glucose absorption, decreasing fluctuations in serum levels, but may cause GI discomfort, increase flatus, and affect vitamin/mineral absorption.
Review medication regimen, including onset, peak, and duration of prescribed insulin, as applicable, with patient/SO.	Understanding all aspects of drug usage promotes proper use. Dose algorithms are created, taking into account drug dosages established during inpatient evaluation, usual amount and schedule of physical activity, and meal plan. Including SO provides additional support/resource for patient.

ACTIONS/INTERVENTIONS	RATIONALE
Teaching: Disease Process (NIC)	

Independent	
Review self-administration of insulin and care of equipment. Have patient demonstrate procedure (e.g., drawing up and injecting insulin, insulin pen technique, or use of continuous pump).	Verifies understanding and correctness of procedure. Identifies potential problems (e.g., vision, memory, and so on) so that alternative solutions can be found for insulin administration. *Note:* If multiple daily injections are required, combinations of regular, intermediate, and long-acting insulin are used. If the pump method is used, patient programs his or her own basal and bolus settings. Only regular insulin is administered, with a basal dose throughout the day and bolus doses before meals and as needed. An insulin pump more closely mimics normal pancreatic activity because the basal rate may be changed relative to patient's activity level, presence of stressors/infection or menstrual cycle.
Discuss timing of insulin injection and mealtime.	One of the many inconveniences people with diabetes cope with is having to decide at least 30–60 min in advance when they are going to have a meal for the timely administration of regular Humulin injections. A newer product, insulin lispro (Humalog), may be helpful because it works best when taken within 15 min of eating. With the onset twice as fast as regular human insulin and a duration approximately half as long, Humalog closely mimics pancreatic activity. However, hypoglycemia may develop more rapidly and be more severe than with use of regular insulin. A blood glucose level below 80 mg/dL indicates that insulin should be injected after eating rather than before the meal.
Review individual's target blood glucose levels.	Although this range varies per person, the ideal range for the adult diabetic is considered to be 80–120 mg/dL. *Note:* Patients with an insulin pump may maintain blood glucose levels between 120 mg/dL and 200 mg/dL with no urinary ketones.
Stress importance and necessity of maintaining diary of glucose testing, medication dose/time, dietary intake, activity, feelings/sensations, life events.	Aids in creating overall picture of patient situation to achieve better disease control, and promotes self-care/independence.
Discuss factors that play a part in diabetic control, e.g., exercise (aerobic versus isometric), stress, surgery, and illness. Review "sick day" rules.	This information promotes diabetic control and can greatly reduce the occurrence of ketoacidosis. *Note:* Aerobic exercise (e.g., walking, swimming) promotes effective use of insulin, lowering glucose levels, and strengthens the cardiovascular system. A "sick day" management plan helps maintain equilibrium during illness, minor surgery, severe emotional stress, or any condition that might send glucose spiraling upward.

ACTIONS/INTERVENTIONS	RATIONALE
Teaching: Disease Process (NIC)	
Independent	
Review effects of smoking on insulin use. Encourage cessation of smoking.	Nicotine constricts the small blood vessels, and insulin absorption is delayed for as long as these vessels remain constricted. *Note:* Insulin absorption may be reduced by as much as 30% below normal in the first 30 min after smoking.
Establish regular exercise/activity schedule and identify corresponding insulin concerns.	Exercise times should not coincide with the peak action of insulin. A snack should be ingested before or during exercise as needed, and rotation of injection sites should avoid the muscle group that will be used in the activity (e.g., abdominal site is preferred over thigh/arm before jogging or swimming) to prevent accelerated uptake of insulin.
Identify the symptoms of hypoglycemia (e.g., weakness, dizziness, lethargy, hunger, irritability, diaphoresis, pallor, tachycardia, tremors, headache, changes in mentation) and explain causes.	May promote early detection and treatment, preventing/limiting occurrence. (However, approximately 30% of insulin-dependent patients are asymptomatic when hypoglycemic.) *Note:* Early morning hyperglycemia may reflect the “dawn phenomenon” (indicating need for additional insulin) or a rebound response to hypoglycemia during sleep (Somogyi effect), requiring a decrease in insulin dosage/change in diet (e.g., hs snack). Testing serum levels at 3 AM aids in identifying the specific problem.
Instruct in importance of routine examination of the feet and proper foot care. Demonstrate ways to examine feet; inspect shoes for fit; and care for toenails, calluses, and corns. Encourage use of natural fiber stockings.	Prevents/delays complications associated with peripheral neuropathies and/or circulatory impairment, especially cellulitis, gangrene, and amputation. *Note:* Studies show that approximately 15% of all patients with diabetes will develop a foot or leg ulcer during the course of the disease. Also 50% of all nontraumatic lower extremity amputations occur in people with diabetes. Prevention is therefore critical.
Demonstrate/discuss proper use of transcutaneous electrical nerve stimulator (TENS) unit. Identify safety concerns following local nerve block.	May provide relief of discomfort associated with neuropathies.
Stress importance of regular eye examinations, especially for patients who have had type 1 diabetes for 5 yr or more.	Changes in vision may be gradual and are more pronounced in persons with poorly controlled DM. Problems include changes in visual acuity and may progress to retinopathy and blindness.
Arrange for vision aids when needed, e.g., magnifying sleeve for insulin syringe, large-print instructions, one-touch/talking glucose meters.	Adaptive aids have been developed in recent years to help the visually impaired manage their own DM more effectively.

ACTIONS/INTERVENTIONS	RATIONALE
Teaching: Disease Process (NIC)	
Independent	
Discuss sexual functioning and answer questions patient/SO may have.	Impotence may be first symptom of onset of DM. *Note:* Counseling and/or use of penile prosthesis may be of benefit.
Stress importance of use of identification bracelet.	Can promote quick entry into the health system and appropriate care with fewer resultant complications in the event of an emergency.
Recommend avoidance of over-the-counter (OTC) drugs without prior approval of healthcare provider.	These products may contain sugars/interact with prescribed medications.
Discuss importance of follow-up care.	Helps maintain tighter control of disease process and may prevent exacerbations of DM, retarding development of systemic complications.
Review signs/symptoms requiring medical evaluation, e.g., fever; cold or flu symptoms; cloudy, odorous urine, painful urination; delayed healing of cuts/sores; sensory changes (pain or tingling) of lower extremities; changes in blood sugar level, presense of ketones in urine.	Prompt intervention may prevent development of more serious/life-threatening complications.
Identify community resources, e.g., American Diabetic Association, Internet resources/online diabetes bulletin boards, visiting nurse, weight-loss/stop-smoking clinic, contact person/diabetic instructor.	Continued support is usually necessary to sustain lifestyle changes and promote well-being.

POTENTIAL CONSIDERATIONS following acute hospitalization (dependent on patient's age, physical condition/presence of complications, personal resources, and life responsibilities)

Therapeutic Regimen: ineffective management—complexity of therapeutic regimen, economic concerns, perceived susceptibility (recurrence of problem).

Sensory Perception, disturbed: diabetic neuropathy/visual—endogenous chemical alternations (elevated glucose level).