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This table is available at: www.andrews.edu/~coffen/Full_Table.pdf

Table

Tasks for Managing Type 1 Diabetes

Etiology
Knows that nothing s/he did resulted in diabetes
States that diabetes may result from viral infections
Can explain what diabetes is (functionally)
Knows that diabetes is not contagious
Can explain the difference between type 1 and type 2 diabetes
Can explain the function and need for insulin
Can explain the result of a lack of insulin
Can explain how diabetes develops
Knows that the pancreas produces and secretes insulin
Understands that diabetes is a permanent condition
Pharmacology / Insulin
Follows an established method for acute insulin adjustment
Knows s/he must take insulin injections to provide insulin not made by the pancreas
Knows that diabetes is caused by a lack of insulin production
Knows that insulin is required every day
Knows basic difference between beef, pork, and human insulins
Knows the advantages of using human vs. beef/pork insulin

Can name the three classes[1] of insulin

Can name one insulin of each class of insulins

If insulin is not refrigerated it is kept between 59º and 68ºF

Extreme temperatures (<36º or >86ºF) are avoided

Excess agitation is avoided

Knows temperature extremes and agitation can cause loss of usual insulin action

Insulin is discarded one month after opening

Vials are dated when opened

Keeps a spare bottle of each type of insulin used

Cold insulin is not injected to reduce local irritation

Insulin is not subjected to temperature variations:

- Not left in a car
- Taken as a carry-on; not checked through in airline baggage

Knows signs of deteriorated insulin:

- Clear insulins appear cloudy or discolored
- Suspended insulins appear clumpy or frosted

Discontinues use of deteriorated insulins

Knows that absorption rate differs for various injection sites

Knows relative rates of absorption[2] for various injection sites

Mixes insulins properly:

- The time delay after mixing is standardized
- Knows Lente and Ultralente can contaminate Regular insulins
- Knows that Lente begins to bind with Regular immediately

Draws up regular insulin prior to suspended insulin

Knows that normalization of BG can be achieved only via a small amount of insulin working continuously (e.g., Lente/Ultralente) with boluses (e.g., Humalog/Regular) at meals

Does not change insulin species without physician consult

Knows that insulin effectiveness varies as a function of exercise, stress, food absorption rates, insulin mix, and hormonal changes

Knows what kinds of insulins s/he takes

Knows the physical characteristics of the various types of insulin

Knows the functional characteristics[3] of the various types of insulin

Knows that injections must be given at about the same time daily

Understands why insulin should be given at same times daily

Knows where insulin may be purchased

Purchases insulin and syringes

Knows that at puberty, insulin requirements may change

Knows pre-pubertal children usually require .6-.9 U of insulin /kg/day

Knows that pubertal children may require up to 1.5 U/kg/day

Knows that post-pubertal patients usually require <1 U/kg/day

Knows that too much insulin can lead to unstable control

Knows that doses above 1 U/kg/day can cause rebound hyperglycemia and weight gain

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Insulin Technique

States the prescribed amount of each insulin type prescribed

Chooses the correct insulin bottle

Removes needle cover properly

Turns insulin bottle upside down with the syringe inserted

Pulls plunger back to draw insulin

Draws insulin to the correct unit mark

Pushes plunger all the way down when injecting (gives full dose)

Cleans the injection site after injection

Records amount of insulin dose on record sheet

Organizes all necessary materials prior to injection (limits errors)

Cleans hands prior to injection

Cleans the injection site prior to injection

Waits for topical alcohol, if used on site, to dry before injecting

Cleans the top of the insulin vial with 70% isopropyl alcohol

Gently rolls (does not shake) all but short-acting insulins before drawing up insulin

Injects air equal to the insulin dose into the vial (not the insulin) prior to drawing up insulin to avoid creating a vacuum

For mixed doses, injects a volume of air into both vials before drawing up any insulin

Short-acting insulins are drawn before intermediate-/long-acting

Syringe is checked for bubbles after dose is drawn

Flicks syringe until bubbles escape

An appropriate injection site is selected:

- Upper arm
- Anterior and lateral aspects of the thigh
- Buttocks
- Abdomen (but not within 2 inches of the navel)

Knows why it is important to rotate injection sites

Injection sites are rotated to prevent local irritation

Injection sites are rotated within 1 area type for consistent absorption

Avoids injections into body areas likely to be exercised

Insulin is injected subcutaneously (not intramuscular/venous)

An appropriate[4] injection angle is used

A fold of skin is grasped or pinched up for injection

Keeps muscles in injection area relaxed while injecting

Penetrates the skin quickly

Does not change the direction of the needle during insertion/withdrawal

Checks injection site for blood or fluid after injection

Increases BG monitoring if site is wet after injection

Safely handles syringes

Safely disposes of used syringes

Never shares a used syringe with another person

Alcohol is not used directly on the needle[5]

Increases BG monitoring if length of needle is changed

Blood Glucose (BG) and Ketone Monitoring

Knows schedule for testing BG

Knows that ketones come from the breakdown of fat for energy

Knows that ketones result when the body can't use glucose for energy

Knows that ketones may indicate too little insulin

Explains how to check for ketones

Demonstrates how to test urine for ketones

Explains the steps to check BG using his/her glucose system

Demonstrates the fingerstick for BG monitoring

Demonstrates how to record results of BG test

Knows which end of BG strip to insert into meter

Does not touch strip on electrical contacts

Cleans target lancet site before obtaining drop of blood

Cleans target site after blood is used—prevents infection

Uses a new lancet for each blood draw

Disposes of lancet safely

Re-seals bottle of test strips to prevent extended exposure

Disposes of used test strip safely/hygienically

Remembers to take BG monitor with him/her when leaving home

Remembers to take enough strips with him/her when leaving home

Remembers to take enough lancets with him/her when leaving hm

Uses an electronic glucose monitor

Uses BG trends to adjust insulin dosage

Knows when to give rapid acting insulin supplements

Indicates quantity and frequency of insulin supplements when needed

Uses results to adjust caloric intake

Uses results to adjust physical activity

Uses results to learn about individual response to food items

Uses results to learn about how stress affects BG

Uses results to diagnose and treat hypoglycemia

Monitors every 4-6 hours for glucose and ketones when sick

Increases monitoring when traveling across time zones

Monitors to determine basal and bolus doses if on an insulin pump

Uses results to evaluate the effect of self-management changes

Obtains a drop of blood sufficient for accurate result

Maintains temperature stability of meter and strips (<86º F)

Calibrates the meter with each new lot number (if required)

Does not use urine tests for glucose monitoring

Records results in a log (even if the monitor has memory)

Appropriately tests for dawn phenomenon (takes BG at 3-4 a.m.)

Monitors at least before meals and at bedtime

Monitors more if there has been hypo-/hyperglycemia/ketosis

Checks for ketones when BG is consistently >240 mg/dL

Knows target BG levels:

Children ≥ 6 yrs: 80-120 mg/dL at fasting

Children ≥ 6 yrs: 80-180 mg/dL at other times of day

Children < 6 yrs: 90-130 mg/dL at fasting

Children < 6 yrs: 90-200 mg/dL at other times of the day

Identifies things that influence BG levels (e.g., exercise, stress, etc.)

Can define glycosylated hemoglobin or hemoglobin A_{1c}

Knows that A_{1c} measures identify average BG levels during the last 1-3 months)

Can identify hemoglobin results indicating good control

Knows that a good A_{1c} will be deceptive if there have been multiple lows when there have also been many highs

Knows that BG levels can vary even when there is no deviation from the regimen

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Diet

Knows that all CHO becomes sugar when digested

Knows that sugar is CHO

Knows that generally, simple CHOs are absorbed rapidly

Knows that generally, simple CHOs produce rapid BG elevations

Can name several foods with simple CHOs

States that generally, complex CHOs are absorbed more slowly than simple CHOs

Can name several foods with complex CHOs

Knows that there are exceptions to the way simple and complex CHOs affect BG

Knows that exceptions are related to a food's Glycemic Index (GI) and Glycemic Load (GL)

Knows that foods with a low GI number raise BG slowly and foods with a high GI raise BG rapidly

Can name at least one simple carbohydrate with a low GI

Can name at least one complex carbohydrate with a high GI

Can define GL in relation to BG

Demonstrates the ability to interpret labels on sugar-free products appropriately

Describes how sugar gets into the body

States that blood sugar levels are caused by food for the most part

States that some sugar can be made from protein

Knows that everyone has glucose in their blood

Eats at consistent times

Knows that skipping a meal or snack can significantly affect BG

Meals are synchronized with time-actions of insulin

Knows that about the same amount and types of food must be eaten from day to day

Knows that food from one meal cannot be substituted at another

Knows CHO, protein, and fat must be balanced for good health

Gets 55-60% (adults: 45-55%)[6] of calories from CHO

Limits concentrated sweets[7] (i.e., sucrose), including sugar-free products, because they do not contain an appropriate balance of CHO, protein, fat, nutrients, and fiber

Gets <30% of daily calories from fat

Gets <7% of daily calories from saturated fat

Gets <200 mg of cholesterol daily

Knows that excessive fat can cause significant health problems

Gets 12-15% of calories from protein (adults: .8-1.2g/kg)

Can evaluate food labels for nutritive (caloric) sweeteners

Gets <3000 mg of sodium per day (1000 mg/1000 kcal)

Selects appropriate foods from a menu

Reads labels on packaged foods

Knows that diet is an essential element of diabetes control

Follows precautions regarding alcohol use:

- Eats before[8] drinking any alcohol
- ≤2 alcoholic equivalents[9] used 1-2 times / wk (ideally, none)
- Food is not omitted[10] when alcohol is consumed

Knows that fruit juice or mixers with sugar added to alcohol can significantly affect BG

Knows that drinking alcohol that contains carbohydrate can significantly affect BG

Knows that drinking may cause him/her to forget shots, eat too much, etc., and takes precautions against this

Eats bedtime snack even if BG is high after alcohol consumption

Follows guidelines for sick days

15g of carbohydrate consumed over 1-2 hours in small quantities or, 50g consumed every 3-4 hours to prevent starvation ketosis[11]

Drinks small sips of fluids every hour or so[11]

Replaces electrolytes via small amounts of salty foods/liquids[11]

Sips 15g of CHO over 1-2 hrs if foods/liquid cannot be tolerated

Follows a meal plan[12]

If patient is on an exchange system:

Knows that a Starch/Bread exchange contains 15 grams of CHO

Knows that a Fruit exchange contains 15 grams of CHO

Knows that a Milk exchange contains 12 grams of CHO

Follows caloric guidelines for age/weight/activity

Does not deviate >1hr. from scheduled snacks

Sees a registered dietitian every 3-6 mos. (6-12 mos. for adult)

Knows high-fiber diets improve CHO metabolism, lowers total cholesterol and LDL cholesterol

Gets 35-50g of fiber/day (25 g/1000 kcal, but not >50g)

Eats at least 3 regular meals, a bedtime snack, and one or more between-meal snacks (may

differ if on intensive insulin therapy)

Knows that children/teens may need 1-2 snacks to maintain growth

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Exercise

Knows that people with diabetes are not restricted in amount of exercise

Knows how much CHO[13] is needed acutely per hour of exercise

Decreases insulin when appropriate

Increases daily food intake when necessary

Eats CHO after exercise to avoid post-exercise hypoglycemia

Knows how long[14] glucose will decline after exercise

Avoids insulin injections close in time to exercise

Monitors glucose before, during, and after exercise

Adjusts insulin/eats considering appropriate[15] factors

Adjusts insulin/eats appropriate[16] quantities

Knows that exercise usually requires additional food intake

Waits 60-90 minutes after a meal to exercise

Avoids exercising during insulin's peak effect

Exercises only if BG is between 100-200 mg/dL and no ketones

Carries a fast-acting carbohydrate

Wears ID/medic alert at all times, but especially while exercising

Exercises with someone familiar with his/her diabetes

Has properly fitting and protective exercise shoes

Exercise is stopped when feeling faint

Exercise is stopped when pain is experienced

Exercise is stopped when unusually short of breath

Exercise is stopped when hypoglycemic

Knows that low-intensity exercise (<50% of maximum heart-rate reserve) has less effect on BG than high-intensity exercise

Can calculate maximum heart-rate (HR) reserve[17] and target HR

Works with health professionals to develop an individualized exercise program [for diabetics with no complications present]

Works with health professionals to develop an exercise program in light of concurrent diabetic complications

Knows that regular exercise is an important part of diabetes control

Consistently participates in an appropriate exercise program

Knows that exercise increases sensitivity to insulin

Knows that exercise increases glucose utilization

Can indicate diabetes-specific benefits[18] of exercise

Knows that glucose production by the liver is inhibited by exercise

Knows exercise depletes glycogen stores which must be replenished and can lead to prolonged glucose-lowering effects

Uses proper footwear

Avoids exercising in extreme heat or cold

Inspects feet after exercising

Avoids exercise during periods of poor metabolism

Identifies an appropriate pre-exercise snack

Does not exercise if ketones are positive

Eats 10-15g (or individualized amount) of rapid-acting CHO every 30-60 minutes of exercise

Knows that exercising when BG is already high can increase BG even more

Reduces insulin dose for respective period by about 20% after strenuous activity lasting more than 45-60 minutes

Knows that high BG after exercise may be temporary due to adrenaline and so waits 60 minutes before bolusing

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Hypoglycemia

Defines hypoglycemia as low blood sugar

Tests glucose before, during, and after treatment of hypoglycemia

Knows that treating hypoglycemic symptoms will terminate them

Knows that hypoglycemia gets worse if not treated

Knows that treatment of hypoglycemia consists of eating sugar

Begins treating with 10-15g of CHO (5-10 for younger children)

Knows that it takes 10-15 minutes for treatment to terminate symptoms of hypoglycemia

Glucose is tested 15 minutes after treating

Additional 15g CHO taken after 10-15 minutes if symptomatic or glucose <70 mg/dL

Does not treat hypoglycemia with chocolate or ice cream[19]

The scheduled snack or meal is eaten following treatment

The food used to treat is in addition to regular meal plan

Knows that symptoms are usually felt when BG is low

Knows that BG<70 mg/dL indicates impending hypoglycemia

Can describe typical[20] symptoms

Can describe idiosyncratic symptoms

Recognizes their own hypoglycemia

Knows that hypoglycemic symptoms can occur with rapid BG declines even if measured BG is greater than 70 mg/dL

Treats symptoms of hypoglycemia even if BG cannot be tested

Knows the typical causes of hypoglycemia, such as:

- Excessive insulin
- Skipped or inadequate meals
- Immediate effects of exercise
- Long-term effects of exercise
- Ingestion of ethanol without food
- Onset of monthly menstrual cycle
- Autonomic neuropathy leading to delayed gastric emptying

Decreases insulin or increases food intake appropriately in response to patterned hypoglycemia

Notifies health professional following severe (e.g, unconsciousness) hypoglycemic episodes

Knows insulin needs are lower between midnight and 3 am

Knows that nighttime hypoglycemia can occur without waking the person

Checks 3 am BG at least once a week

Checks 3 am BG following a day of unusual activity

Checks 3 am BG following a day of unusual food consumption

Checks 3 am BG when insulin doses are being adjusted

Always measures bedtime BG to prevent nocturnal hypoglycemia

Has a bedtime protein+CHO snack if bedtime BG<120 mg/dL

Moves dinner intermediate-/long-acting insulin to bedtime if a reduction in short-term dose at

dinner is made to prevent nocturnal hypoglycemia and if this results in fasting hyperglycemia

Avoids delaying a meal more than 30 to 60 minutes

Carries a source (or sources) of CHO (10g-15g) at all times

Knows how to inform family and friends how to treat hypoglycemia

Knows what glucagon is

Glucagon is kept available

Knows glucagon takes 10-15 minutes to work

Makes sure family/friends know when and how to administer glucagon

Adjusts treatment plan in response to repeated daily hypoglycemia

Knows that insulin may need to be reduced if weight is lost

Knows small ketones in the morning may indicate nocturnal hypoglycemia

Treats hypoglycemia as soon as symptoms are noticed

Knows hypoglycemia can lead to unconsciousness or seizure

Takes safety precautions when experiencing hypoglycemia (e.g., stops driving, etc.)

Knows glucagon is available only by prescription

Keeps glucagon at home and at work/school

Has informed family/friends/co-worker/teacher:

To give glucagon if s/he passes out

To call for emergency help

Not to give him/her insulin

Not to give him/her food or fluids

Not to put their hands in his/her mouth

Knows that things[21] other than hypoglycemia can cause symptoms

Knows types of food/drinks that effectively treat hypoglycemia

Knows that there is a possibility for a rebound hyperglycemia after hypoglycemia

Knows that the rebound may be due to the action of counter-regulatory hormones

Knows counter-regulatory hormones may also produce ketonuria

Knows rebound can occur without hypoglycemic symptoms

Knows hypoglycemia is most likely when insulin effects are peaking

Knows that one incident of severe hypoglycemia is frequently followed by another hypoglycemia incident

Knows how to decrease the potential of a second hypoglycemic incident following an earlier hypoglycemic incident

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Hyperglycemia

Knows typical[22] symptoms

Knows idiosyncratic symptoms

Discusses appropriate treatment of hyperglycemia with doctor

Applies prescribed treatment when hyperglycemic

Knows that some types of neuropathy are related to the duration and severity of hyperglycemia

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Ketoacidosis (KA)

Knows that KA means dangerously high levels of ketones

Knows that KA means the body is burning fat (instead of glucose) for energy and this results in ketones as a by-product

Knows ketones are acids that build up in the blood

Knows that ketones are found in the urine if there is an insulin deficiency

Knows ketones poison the body

Knows KA can lead to coma and death (i.e., is life-threatening)

Knows ketones can indicate the onset or presence of illness

Knows ketones can indicate the diabetes is "out of control"

Knows KA usually results in hospitalization

Knows KA usually develops slowly

Knows KA can develop within a few hours when vomiting occurs

Knows initial symptoms of KA:

Thirst and/or a very dry mouth

Excessive urination

High BG levels

"Moderate"[23] quantities of ketones as measured by urine samples

Knows subsequent symptoms of KA:

Constantly feeling tired

Dry or flushed skin

Nausea, vomiting, or abdominal pain

Difficulty breathing

Fruity odor on breath

Difficulty concentrating or confusion

Calls physician or goes to ER immediately if any of the symptoms are present

Has test strips available to test for ketones

Tests for ketones every 4-6 hours when ill

Tests for ketones every 4-6 hours when BG >240

Tests for ketones when any symptoms of KA are present (e.g., nausea, vomiting, abdominal

pain)

Knows ketones can result from lack of insulin, lack of food, or an untreated insulin reaction (e.g., nocturnal hypoglycemia)

Knows to drink lots of water when ketones are present

Stress/Illness

Knows that illness/stress can raise BG levels

Knows that illness/stress increases chance of KA

Knows that during illness insulin needs may increase in spite of decreased food intake

Knows that insulin action is diminished during illness/stress

Knows that glucose is released by the liver during illness/stress

Drinks ≥ 8 oz. of water/hr while awake to prevent dehydration

Avoids caffeinated drinks (which are diuretics)

Increases BG monitoring frequency during illness/stress

Knows that symptoms of illness/stress can mask and/or mimic usual symptoms of hypo-/hyperglycemia

Is able to test ketones

Tests ketones every 4-6 hours during illness/stress

Checks BG before adjusting insulin dose

Knows that insulin must be given even when unable to eat

When unable to eat:

Gives full dose of intermediate/long-acting insulin

Supplements with 10% of routine dose of short-acting insulin

Supplements with 20% if BG>300 mg/dL and ketones are large

Knows that supplements of short-acting insulin may be needed

Knows or inquires about the effects of medications on BG

Uses sugar-free over-the-counter medications (OTCs) if possible

Increases BG monitoring when using OTCs that advise against use by persons with diabetes and calls health professional if necessary

Knows whom to call in case of illness

Calls a health professional if:

- Vomiting occurs more than once
- Diarrhea lasts >24 hrs or occurs >5 times
- Breathing is difficult
- BG>300 mg/dL on two consecutive measurements
- Urine ketones are moderate or large

Has developed a plan of action with his/her physician:

- When to call the physician
- When to increase BG and ketone monitoring
- Types of foods and fluids to take during illness
- How to adjust medication during illness

Calls physician if:

- The illness does not improve after 1-2 days
- Diarrhea or vomiting persists for >6 hours
- Ketones in urine measure moderate to large
- Abnormal sleepiness
- Any doubt about what to do for the illness

Any symptoms of KA

Checks with physician or pharmacist regarding the effect of a drug on diabetes control

Participates in a regular exercise program to combat stress

Knows idiosyncratic response[24] to stress

Uses appropriate stress management techniques

Traveling

Takes appropriate[25] supplies

Appropriately stores and keeps accessible supplies during travel

Keeps meal and snack times as consistent as possible

Monitors glucose before driving

Keeps extra source of carbohydrate in car to treat hypoglycemia

Prevents freezing of insulin, meters, and strips

Continuous Subcutaneous Insulin Infusion (CSII; Insulin Pump)[26]

Knows primary purpose for CSII is improved control and reduced diabetic complications

Has realistic expectations for CSII

Knows major risks of CSII (ketoacidosis, hypoglycemia, site infection)

Counts CHO when available on food packages

Counts CHO when available from restaurant printed materials

Estimates CHO as accurately as possible when info not available

Knows that "basal" refers to the amount of 24-hr continuously delivered insulin in units per hr (usually .4 - 1.6)

Knows that "bolus" refers to a rapidly delivered dose of insulin

Knows that 45-60% of total amount of insulin needed per day is usually delivered as basal

Knows that 40-55% of total amount of insulin needed per day is usually delivered as boluses to cover meals (CHO)

Knows that basal is too high if BG drops when a meal is skipped

Knows that basal is too high if BG is often low early A.M. or before breakfast

Knows that basal is too high if BG is repeatedly low during day

Knows that basal is too low if BG rises when a meal is skipped

Knows that basal is too low when BG is repeatedly high during day

Knows to change basal rates in small increments well before (~6 hrs) the time when the problem BG is noticed

Knows to use different basal rates on weekends if weekend activities are quite different

Tests BG at least 4-6 times per day (ideally, pre- and post-prandial, before bed, and at night)

Tests BG before driving

Records BG readings

Records basals

Records boluses

Records hypoglycemia

Records hypoglycemia treatments

Records carbohydrate intake

Records exercise duration and intensity

Records time and date for each item recorded (BG, basal, bolus…)

Matches basals and boluses to insulin need by problem-solving blood sugar patterns

Knows how to program and change basals and boluses

Overnight basal is stable (bedtime BG 80-120 mg/dl with normal morning BG)

Daytime basal is stable (can skip a meal if preprandial BG 100-120 mg/dl without BG dropping >30 over 5 hours)

Accurately boluses for CHO (if pre-prandial BG is normal, can bolus insulin so BG is normal 4 hrs later)

High BG bolus (can bolus insulin to normalize BG 4 hrs later)

Prevents "stacking" (if 2 boluses ≤ 3.5 hrs apart, determines unused insulin from 1st bolus; typically 30% of bolus is used / hr)

Recognizes hypoglycemic reactions

Handles hypoglycemic reactions without BG rising ≥ 150 mg/dl

Knows likely causes of hypoglycemia with CSII

- Infrequent SMBG
- Improper timing of bolus
- Using too large a bolus or too many (e.g., “stacking”)
- Too few CHO in meal
- Increased activity

Has non-expired Glucagon emergency kit at home for use

Home support person is trained to use Glucagon

Has non-expired Glucagon emergency kit at school for use

School support person is trained to use Glucagon

Can keep BG between 70-150 mg/dl when exercising

Can insert/change pump batteries

Always has spare batteries available

Programs pump to deliver correct basal rate

Uses the pump to deliver correct bolus

Inserts insulin reservoir into pump

Attaches infusion set to reservoir

Inserts infusion set needle/catheter at insertion site

Identifies pump alarms

Knows how to stop or suspend pump

Knows how to review pump memory for basals, boluses, alarms, etc.

Knows how to wear the pump

Can analyze BG patterns

Knows how to correct problematic BG patterns

Does not skip or delay a meal after a bolus of rapid acting insulin

Does not suspend pump to treat low BGs

If BG ≥ 300 mg/dl, takes bolus by syringe

Has set schedule for days to change infusion site

Changes infusion site within 72 hrs

Ensures O-rings (where present) are lubricated regularly

Can transfer insulin into reservoir

Eliminates bubbles from reservoir

Can detach reservoir needle and replace it with infusion set hub

Prevents leaks from hub by firmly tightening hub to reservoir

Primes infusion line with insulin before inserting into pump, or, uses pump to prime infusion line

Uses pump bolus operation to fill infusion set to tip

Washes hands prior to preparing infusion site

Does not touch parts that will indirectly or directly contact infusion site

Does not breathe on or blow on parts that will indirectly or directly contact infusion site

Disinfects 2-inch diameter area of skin around infusion site

Allows disinfected infusion area to dry before proceeding

Places medical adhesive on infusion site

Positions infusion set needle parallel to beltline but not underneath belt

Properly boluses if using Teflon infusion set

Loops infusion line and tapes it to skin 1-inch from infusion site

Checks infusion site daily

Changes infusion site immediately when red, swollen or bleeding

Never primes infusion set when it is still attached to body

Never attempts to unclog infusion line when it is attached to body

Changes infusion sets in mornings, not evenings

Knows his/her insulin to CHO ratio (ICR) for CHO counting / bolusing

Measures servings of foods eaten carefully (measuring cups, scales, etc.) to accurately count CHO

Knows by how many mg/dl 1g of CHO raises his/her BG

Knows by how many mg/dl 1U of insulin lowers his/her BG

Knows by how many mg/dl a certain degree and length of exercise lowers his/her BG

Has contact information for 24-hour help with pump

Knows that insulin reactions are less dramatic on CSII and requires more frequent BG monitoring

Handles pump properly when bathing (detaches, hangs, etc.)

Handles pump properly when sleeping (free under pillow, clamped to PJs, etc.)

Does not expose pump to heat (e.g., hot tubs or saunas)

Knows how to detach pump during exercise or showering, etc.

Prevents water exposure if pump is not waterproof

Has preparations in place in case of pump problems

Knows glycemic index information for foods

Can adjust bolus for glycemic index of foods

Can insert infusion set subcutaneously

Determines his/her total amount of insulin needed per day

Adjusts her total amount of insulin needed per day for premenstrual rises in blood sugars

Adjusts basal when stress leads to increased BG

Adjusts basal when illness results in increased BG

Establishes stable basal rates before adjusting bolus ratios

Knows that kids often need additional basal in early A.M. when surges of growth hormone can occur

Ensures school has backup necessities (batteries, infusion set, reservoir, insulin, etc.)

Knows how to troubleshoot pump issues for high BGs

- Ensures insertion set is properly placed under skin
- Ensures insertion site is free of physical problems (scarring, etc.)
- Considers use of a different site that provides better absorption
- Ensures that cannula is not crimped
- Ensures line is free of blood

Ensures line is free of air

Ensures line is not clogged:

removes insertion set from body

has pump deliver a ~5U bolus

insulin should come out of infusion set needle

Ensures infusion set is securely connected to pump

Ensures infusion line is not damaged/does not leak

Ensures hub is not loose

Ensures O-ring does not have a leak

Ensures basal settings are correct

Ensures bolus dose was correct

Ensures bolus was given at correct time

Ensures pump is not in suspend mode

Ensures that reservoir has insulin

Ensures potency of insulin (typically by discarding current insulin and replacing with new insulin)

Knows circumstances leading to "insulin tunneling" (insulin leaks out around skin at insertion set site)

Acts on pump alarms by troubleshooting or planning

Knows what foods or products are rapid acting CHOs

Always carries rapid acting CHOs

Knows what a square-wave bolus is vs. dual-wave bolus

Knows when to use square-wave vs. dual-wave bolus

Complications

Knows possible acute and long-term complications of diabetes mismanagement:

Hypoglycemia

Ketoacidosis

Hyperglycemia

Knows that most acute complications can be avoided with proper care

Knows potential complications of diabetes:

Hypoglycemia

Hyperglycemia

Periodontal disease (gum infection)

Knows diabetics are at increased risk for gum disease

Brushes teeth at least twice/day

Uses dental floss once a day to remove bacteria from between teeth

Brushes where the teeth meet the gums

Sees the dentist every 6 months

Sees the dentist if gums bleed while eating or brushing teeth

Diabetic KA

Hypertension

Arterial blockage can cause impotence

Retinopathy (eye disease)

Knows that nearly all patients with diabetes develop some degree of retinopathy after 20 years

Knows that hyperglycemia is associated with retinopathy

Knows that hypertension is associated with retinopathy

Knows vision-threatening retinopathy may be asymptomatic

Knows that laser photocoagulation therapy can prevent vision loss in many patients with retinopathy

Knows that many eye problems are minor and easily treated

Knows that some eye problems are serious and may cause blindness

Knows diabetes is the leading cause of blindness for adults in U.S.

Knows 80% of diabetics will develop at least some background retinopathy after 15 years of diabetes

Receives a comprehensive ophthalmologic exam once/yr after having diabetes for 5 years

Reports any change in vision to the physician

Nephropathy (kidney disease)

Knows that high BG levels may cause blood vessel changes over time that prevent the kidneys from filtering out waste

Knows that swelling of feet and ankles, feeling tired, and pale skin can indicate kidney damage

Knows that kidney damage may necessitate hemodialysis

Knows that high blood pressure and frequent urinary tract infections can affect kidney function

Cardiovascular disease

Neuropathy

Can lead to impotence

Knows that peripheral neuropathy is the most common long-term complication of diabetes

Knows that some types of neuropathy are related to the duration and severity of hyperglycemia

Knows 50% of diabetics will develop some sort of neuropathy

Foot problems

Knows foot problems are a major cause of morbidity, mortality, and disability in diabetics

Knows problems in the presence of neuropathy/ischemia can result in lower-extremity amputations

Knows daily foot inspection is preventative of amputations

Knows patients with neuropathy are at high risk for foot ulcers

Knows patients with vascular disease are at high risk for foot ulcers

Knows hyperglycemia can increase risk of foot problems

Knows that foot problems can develop quickly

Knows symptoms of poor circulation related to foot problems:

Cold feet

Leg cramps

Shiny or dry skin

Loss of hair on the toes, feet, or legs

Slow healing of foot and leg injuries

Knows symptoms of nerve damage related to foot problems:

Pain, numbness, burning, and/or tingling in the legs/feet

Very little feeling in the feet

Knows feet may become very dry and skin may crack

Applies lotion to feet after bathing

Does not apply lotion between toes

Has physician examine feet at each visit

Washes feet every day with mild soap

Never uses very hot water to wash feet

Dries feet carefully, especially between the toes

Checks feet and between toes every day

Reports foot infections to physician

Checks inside shoes for pebbles/objects before putting them on

Checks water temperature with finger/elbow (not feet) before bathing

Avoids hot water bottles, heating pads, or electric blankets which can cause burns without feeling them if neuropathy is present

Never walks barefoot

Has physician cut corns and calluses (does not self-treat)

Wears shoes that fit and are comfortable

Changes socks/nylons every day and wears socks/nylons that are even and smooth and keeps them from wrinkling while wearing

Does not soak feet

Toenails are cut slightly curved to the contour of the toe

Does not use chemicals on feet (e.g., to remove corns, etc.)

Maintains proper circulation (i.e., avoids sitting with legs crossed, tight garments, etc.)

Assesses feet for redness, swelling, cuts, blisters, calluses, dryness, cracks, corns, and any change in appearance

Seeks care within 48 hours for even “small” problems

Neurogenic bladder (damage to bladder nerve fibers):

Diminished urination frequency

Difficult/incomplete bladder emptying

Frequent urinary infections

Sexual dysfunction (due to nerve damage):

Males: 75% experience difficulties

Males: retrograde ejaculation

Males: impotence; loss of erectile capacity

Females: reduction in arousal

Females: diminished vaginal lubrication

Females: decreased frequency of orgasm

Gastroparesis (due to nerve damage):

Early satiety

Feeling full after meals

Heartburn, reflux

Reduced appetite

Hypoglycemia after meals (delayed stomach-emptying)

Intestinal disorders (due to nerve damage):

Constipation (in up to 60% of diabetics)

Nocturnal diarrhea

Incontinence

Cardiovascular disorders (due to nerve damage):

Postural hypotension (systolic drop when moving to stand)

Painless heart attack and sudden death

Fixed heart rate

Pupillary (abnormalities due to nerve damage):

Reduced responsiveness to light

Decreased pupil size

Diabetic nephropathy (kidney disease)

Occurs in about 30% of people with diabetes

Occurs, on average, 20 years after diagnosis

Knows symptoms are not readily detectable by the patient

Coronary artery disease

Knows this is the greatest cause of mortality in diabetes

Mortality is 2-4 (possibly 8) times that of non-diabetic populations

Extremity amputation

Knows appropriate standards of care that health providers should provide

Seeks medical attention in response to symptoms of complications

Knows that complications are multifactorial but that diabetes control is one factor

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General Knowledge

Knows why[27] insulin cannot be taken as a pill

Knows the function and need for glucose metabolism

Knows that cells need glucose inside of them to work

Knows that glucose is the major fuel for cells

Knows that sugars are used by the body for energy

Knows that insulin is necessary for glucose to be used

Knows what the dawn phenomenon[28] is

Aware that smoking causes insulin resistance

Knows that intensive insulin and dietary therapy that maintains glycemic control can delay diabetic vascular complications

Knows that smoking is especially dangerous for people with diabetes because it increases the already high risk for blood-vessel disease

Knows caffeine can raise BG and make recognizing symptoms of low BG difficult

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Miscellaneous

Uses mild soap to clean skin

Uses warm (not hot) water to clean skin

Uses a non-oil-based moisturizing lotion for skin

Uses sunscreen when in the sun

Has a clearly visible medic alert indicating s/he has diabetes

Knows how to get help when needed

Informs gym teachers and coaches of diabetes

Informs gym teachers and coaches of need for exercise snacks

Gym teacher and coaches are prepared to treat hypoglycemia

Visits physician at least quarterly

Knows that puberty/menses may be delayed in diabetics, especially in poorly controlled diabetics

Knows that menstrual irregularities are more common in poorly controlled diabetics

Knows that diabetes may be more difficult to control while taking birth control pills

Knows that pregnancy for women with diabetes requires an unusually disciplined regimen

Knows most infants of mothers with diabetes will not have diabetes

Areas Not Covered

Use of pre-filled insulin pens (infrequently used for contemporary type 1 regimens)

Interactions with health professionals

Social aspects (e.g., sleep-overs at friend's house, parties, etc.)

Cultural aspects of care/education

Pregnancy (e.g., teen pregnancy)

Perioperative situations

Dealing with managed health care and insurance coverage

[1]Short/rapid-acting, intermediate-acting, long-acting.

[2]From most to least rapid absorption: abdomen, arm, leg, hip/buttocks.

[3]From ADA, 1994, *Medical Management of Insulin-Dependent (Type I) Diabetes*, p. 37, Table 3.2, and, Eli Lilly and Company, 1997, PA 6662 AMP (information leaflet included with Humalog insulin vials), and, ADA, 2006 resource guide: A supplement to diabetes forecast (Insulin section), retrieved May 31, 2006, from http://www.diabetes.org/diabetes-forecast/resource-guide.jsp, but see also AACE, 2002 for alternative actions:

Insulin	Onset (hrs)	Peak (hrs)	Duration (hrs)
Animal			
Regular	½–2	3–4	4–8
NPH	4–6	8–14	16–24
Lente	4–6	8–14	16–24
Ultralente	8–14	Minimal	24–36
Human			
lispro/Humalog/ aspart/Novolog	≤ ¼[a]	½–2	2–4[a]
Regular	½–1	2–3	3–6
NPH	2–4	4–10	10–18
Lente	3–4	4–12	12–20
Ultralente	6–10	None	18–30
glargine/Lantus	1-4	None	20-24

[a]Recently there has been some information suggesting that lispro does not get into the blood and does not get out as quickly as was once thought (Hirsch, 2005)

[4]To avoid intramuscular injections a 90º angle may be used for an average weight adult and a 45º angle should be used for a child or thin person.

[5]The needle is coated in silicon to make injection less painful; alcohol may remove the silicon coating.

[6]It is believed that consuming 60% or more of calories from carbohydrate would lead to increased glucose levels following a meal, but, the ADA recommends individualization, so, this task might be to follow the dietitian's recommendations when those are available.

[7]The concern has historically been that concentrated sweets are absorbed more rapidly into the blood stream than starches (i.e., carbohydrate from non-sucrose sources, e.g., breads, fruits, vegetables, cereals, grains); however, research does not substantiate this; therefore, this item may not be applicable.

[8]Drinking on an empty stomach can lead to low blood sugar.

[9]One equivalent = 1 oz of liquor; 1.5 oz of distilled beverage; 4 oz of wine; or 12 oz of beer.

[10]Because of the possibility of alcohol-induced hypoglycemia (due to alcohol being metabolized before food due to its toxicity and its inability to be converted into glucose) no food should be omitted.

[11]Applicable when nausea and vomiting are involved.

[12]Numerous different methods of planning meals are available (e.g., Exchange Lists, Carbohydrate Counting, Constant Carbohydrate, etc.). With the assistance of a registered dietitian, a meal plan can be mutually agreed upon and designed to meet the patient's individual needs.

[13]10-15g per hour of exercise are recommended as a general guideline, but exercise is subject to large individual differences.

[14]Glucose can continue to decrease for as long as 12 to 24 hours after exercising.

[15]Factors to consider: the time of exercise in relation to type and quantity of insulin; the previous meal; type, intensity, and duration of exercise; and pre-exercise blood glucose level.

[16]A pre-exercise snack (e.g., 15g CHO for 30 minutes or less of exercise, 20-30g CHO for 30-60 minutes of exercise, and continuous CHO replacement [e.g., sucking a hard candy, etc.] for exercise longer than 60 minutes) is suggested if BG is 100-120 mg/dL or if more than 90 minutes have passed since the last meal.

[17] Max HR reserve = 220 – age; target HR = Max HR reserve * [60-85%].

[18]E.g., exercise decreases risk for heart disease through cardiovascular conditioning, reduces cholesterol, increases HDL, increases insulin sensitivity, helps control hypertension, reduces stress, and aids in weight management.

[19]The fat content of these items reduces the rate that CHO is available.

[20]E.g., paleness, sweating, increased heart rate, palpitations, hunger, numbness or tingling in arms and hands, shakiness, inability to concentrate, confusion, slurred speech, irrational/uncontrolled behavior, slowed reaction time, vision changes/blurriness, extreme fatigue, disorientation, unconsciousness, inability to awake from sleep, tingling sensations around mouth, headache, clumsy or jerky movements, and seizures.

[21]E.g., anxiety, fatigue, etc.

[22]Symptoms include: excessive urination, excessive thirst, blurred vision, excessive hunger, weakness, depression, sluggishness, headache, nausea, vomiting, abdominal discomfort, inability to catch his/her breath, and hyperventilation.

[23]Test results are usually provided in terms of Negative, Trace, Small, Moderate or Large.

[24]Stress hormones increase the production of glucose; if activity is not greatly increased, hyperglycemia may result, whereas, if activity is greatly increased, hypoglycemia may result (due to a greater sensitivity of cells to receive glucose during stress).

[25]E.g., extra insulin, extra syringes, fast-acting carbohydrate, snacks, glucose meter and supplies, glucagon emergency kit, prescription for syringes, medical ID, prescriptions for medications, name of health care professional at destination, etc. (a directory of English-speaking doctors is available at 716-754-4883).

[26]The majority of this information was compiled from Walsh & Roberts (2000) with additional information in consultation with diabetes educators.

[27]Insulin is a protein and the stomach would digest it before it could get absorbed into the system.

[28]The dawn phenomenon is an increase in glucose levels and need for insulin during the pre-breakfast hours.