Diabetes Mellitus Algorithm
Please review definition and pathophysiology when using the algorithm

Assess for the presence of risk factors of DM Type 1:
- Develops most often in children but can occur at any age.
- Caucasians have a greater risk of type 1 diabetes
- Family history
- Presence of autoimmune disease
- Antecedent viral infections, coxsackie B, enteroviruses, adenovirus, rubella, cytomegalovirus, and Epstein-Barr virus.
- Breastfed infants have a lower risk for IDDM, and a direct relationship exists between per capita cow milk consumption and incidence of diabetes.

Source: [http://www.emedicine.com/ped/TOPIC581.HTM#section~Clinical](http://www.emedicine.com/ped/TOPIC581.HTM#section~Clinical)

Assess for the presence of risk factors of DM Type 2:
- Age greater than 45 years
- Diabetes during a previous pregnancy
- Excess body weight (especially around the waist)
- Family history of diabetes
- Given birth to a baby weighing more than 9 pounds
- HDL cholesterol under 35
- High blood levels of triglycerides, a type of fat molecule (250 mg/dL or more)
- High blood pressure (greater than or equal to 140/90 mmHg)
- Impaired glucose tolerance
- Low activity level
- Poor diet


Are Risk Factors Present?

YES

Fasting plasma glucose > 126 mg/dl (levels between 100-125 mg/dl are considered pre-diabetes)

NO

Initiate client education for Health Seeking Behaviors to identify:
- Maintain ideal body weight
- Eat lots of vegetables and fruits, high fiber, low fat diet
- be physically active for 30 minutes, 5 days a week
- avoid cardiovascular risk factors
- Engage in routine screening for diabetes; American Diabetes Association recommends screening high-risk people for Type 2 DM every three years after the age of 45.
- Engage in DM screening when symptomatic for all others
- Teach s/s to report
- Box 1

Monitor for presence of signs/ symptoms:
- increased thirst
- increased hunger
- fatigue
- increased urination, especially at night
- weight loss
- blurred vision
- sores that do not heal

Are positive findings present?

Unstable?

Newly diagnosed?

Follow collaborative plan of care for hyperglycemia
See atherosclerosis plan of care and PC: arterial ischemia
See PAD algorithm
Follow plan of care to prevent retinopathy, neuropathy, and nephropathy

See plan of care for a Risk for Ineffective Therapeutic Regimen management:
- Discuss course and progression of microvascular and microvascular complications
- Discuss acute complications of hyper/hypoglycemia
- Review testing criteria, FBS, oral glucose tolerance test, random blood sugar testing, HgA1C
- Teach SMBG testing, medical nutrition therapy & antidiabetic therapy
- Teach sick day rules
- Review risk reduction strategies for CKD and CV disease and complications of retinopathy, neuropathy and nephropathy
- Encourage periodic evaluation and diabetic monitoring
- Reinforce teaching box 1

Clinical Guidelines for Adults (Rev. 3/2008)
**PC: Hyperglycemia**

**Outcomes/Benchmarks:**
- Fasting plasma glucose: 90-130 mg/dl, Average 2 hour post prandial glucose, 160 mg/dl
- Average bedtime glucose: 110-150 mg/dl
- Hemoglobin A1C < 7%

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**ASSESS** s/s of Hyperglycemia

- increased thirst
- increased hunger
- fatigue
- increased urination, especially at night
- weight loss
- blurred vision
- sores that do not heal

**Identify High risk populations**

- Undiagnosed diabetes
- Physiological stressors such as infection in a client already under care for DM
- Poorly managed diabetes/nonadherence
- Insufficient antidiabetic therapy

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**MONITOR for s/s Hyperglycemia**

- Mon CBG > 250 mg/dl
- If elevated monitor urine for ketones especially if type 1 DM (ketosis is rare in DM2 but can occur)
- Monitor serum osmo & electrolytes for hyponatremia, hypokalemia or pseudohyperkalemia (hyperkalemia is frequently found in DKA with acidosis) hypochloremia and hypophosphatemia
- Perform ABGs to determine if metabolic acidosis is present (seen in DKA) and monitor serum ketones
- Initiate noninvasive hemodynamic monitoring for s/s volume depletion; hypotension, tachycardia, tachypnea (Kussmaul respiration in acidosis)
- Initiate cardiac monitoring to identify dysrhythmia
- Monitor I/O

**Monitor for contributing factors:**

- Do infection workup if indicated

**Monitor for complications:**

- If hyperglycemia, acidosis and ketosis is present, increase CBG monitoring to every hour, electrolytes every 2 hours and perform stat EKG.

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**DO**

- In DKA: Obtain IV access and initiate IV hydration to correct osmotic diuresis. Start with normal saline or ½ normal saline based on blood pressure and switch to Dextrose ½ normal saline when glucose < 250
- Administer insulin IV as ordered titrated according to CBG results
- Correct potassium and phosphate depletion
- Administer bicarbonate of pH <7.0 and K+ > 3.5

- In HHS: follow plan of care for DKA. If acidosis is present, consider other medical reason that hyperglycemia
  - Expect to administer higher amounts of fluids and insulin

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**CALL**

- Call for refractory hypoglycemia, hemodynamic instability
- Initiate ABC, shock management call ready response team and MD

**PC: Hyperglycemia**

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**Are s/s of hyperglycemia is present?**

- Polyuria, polydipsia, polyphagia, blurred vision

**Initiate collaborative plan of care:**

- PC: Hyperglycemia

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**PC: Hyperglycemia**

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Susan McCabe revised 10/1/08
**PC: Hypoglycemia**

### Outcomes/Benchmarks:
- CBG > 60 mg/dl
- 100 > HR > 60, 140 > SBP > 100 skin; pink warm and dry

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**Is the client experiencing:**
- AMS, irritability, tremor, diaphoresis, tachycardia?

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**YES**
- Follow plan of care for PC: hypoglycemia

**NO**
- Instruct client to wear DM identification
- Teach symptoms of hypoglycemia and make sure any caregivers can recognize the signs.
- Instruct in steps for CBG testing
- Instruct family members in use of glucagon.
- Ensure client carries glucose tabs with them in case of emergency
- Check blood sugar before bedtime and activity to avoid hypoglycemia
- Teach client to avoid alternate site monitoring when hypoglycemia

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### ASSESS s/s of hypoglycemia
- AMS, irritability, tremor, diaphoresis, tachycardia

### Identify High risk populations
- Recent history of frequent low blood sugars, A rapid drop in blood sugar
- Having diabetes for many years
- Alcohol consumption in the last 12 hours
- NPO status or insufficient intake
- Excess insulin absorption or dosing error
- Beta blockers

### MONITOR for hypoglycemia
- Check if CBG < 70 mg/dl /<90 mg/dl at bedtime (plasma glucose readings < 90)
- If capillary glucose is severely low (less < 40) protocols may require repeat CBG measure, however such action should never delay treatment of a symptomatic client
- Obtain stat venous sample if required by hospital protocol. It is not necessary to wait for a result before treatment

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### PC: hypoglycemia

**DO**
- **Conscious client:**
  - The following are examples of readily available sources offering 15 g of carbohydrate:
    - 4 oz apple juice or orange juice (**Do not** give orange juice to renal patients.)
    - 4 oz regular sugar-sweetened cola
    - 6 oz sugar-sweetened ginger ale
    - 3 BD glucose tablets
    - 4 Dex4 glucose tablets

- **Unconscious/NPO client:**
  - Administer Dextrose 50% IV according to CBG reading
  - Repeat CBG in 15 minutes and treat according to protocol

**CALL**
- Call MD and ready response team for refractory hypoglycemia, errors in dosing and insulin administration or changes in PO status

Source: [http://spectrum.diabetesjournals.org/cgi/content/full/18/1/39/TBL3](http://spectrum.diabetesjournals.org/cgi/content/full/18/1/39/TBL3)

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Susan McCabe revised 10/1/08
PC: Microvascular disease

**Outcomes/Benchmarks:**
- Fasting plasma glucose 90-130 mg/dl, Average 2 hour post prandial glucose, 160 mg/dl, Average bedtime glucose 110-150 mg/dl, Hemoglobin A1C < 7%
- Serum creatinine, GFR WNL, no micro/macro albumin in urine, sensation intact, no foot ulceration, no retinopathy

**ASSESS s/s of Microvascular disease**
- Visual disturbances, blood pressure disturbances with sudden weight gain, foot ulceration
- Identify High risk populations
  - Poorly controlled hyperglycemia, hypertension
  - Increased timing since diagnosis

**MONITOR for Microvascular disease**
- Monitor for hemoglobin A1C > 7%
- Monitor for elevations in serum creatinine and calculate GFR
- Monitor results of urinalysis for presence of micro/macro albumin
- Monitor results of fundoscopic exam
- Monitor for elevated blood pressure
- Monitor daily weights
- Monitor neurovascular status of extremities and inspect feet at each shift

**PC: Microvascular disease**

**DO**
- Prevent further harm
  - Administer Antidiabetic therapy as prescribed
  - Administer antihypertensives, antiplatelets, antilipemics as prescribed
  - Provide foot care
- Manage complications
  - Treat ulcerations as ordered
  - Follow plan of care for renal replacement therapy if indicated
  - Initiate falls precaution for visual disturbances related to retinopathy

**CALL**
- Call worsening disturbances; visual, neuropathy, retinopathy. Provide supportive care & call MD

**Follow plan of care for PC:**
- Microvascular disease; retinopathy, neuropathy, and nephropathy

**Is the client experiencing:**
- Visual disturbances, blood pressure disturbances with sudden weight gain, foot ulceration

**YES**

**NO**

Implement plan of care for prevention:
- Teach client in strategies to maintain euglycemia
- Teach foot care, daily inspection and frequent clinician evaluation
- Discuss kidney surveillance, annual testing.
- Avoid nephrotoxins, maintain BP <130/80
- Reduce atherosclerotic risk factors
- Have an Annual eye exam.
Hypoglycemia algorithm

Source: http://spectrum.diabetesjournals.org/content/vol18/issue1/images/large/0039Fig1.jpeg