Diabetes New Diagnosis (Non-DKA) v. 5

**Inclusion Criteria**
- New diabetes diagnosis requiring teaching for insulin use

**Exclusion Criteria**
- Diabetic ketoacidosis (DKA) (use instead [DKA Pathway])
- Continuous insulin infusion
- Intravenous insulin (for hyperkalemia, in TPN)
- Sliding scale insulin

**Establish New Diagnosis**

**Diet**
- Modified Diet Carbohydrate-counted (insulin dependent)

**Medications**
- Consider Total Daily Dose (TDD) insulin 0.3-1 units/kg/day, adjusted according to glucose, using
  - Basal insulin once or twice daily (40-50% TDD)
  - Rapid-acting insulin at each meal, snacks, bedtime, and 0300

**Routine Monitoring**
- Check glucose 1-2 hours after first subcutaneous insulin dose
- Check glucose at least every 3 hours 2100-0900 for first 24 hours
- Check glucose before meals, at bedtime, and 0300 AND
  - At least every 3 hours if NPO
  - At patient/family request
  - If signs of hypoglycemia (pallor, sweating, shaking, irritability, confusion, or seizures)
  - More frequently if vomiting/diarrhea, change in dextrose rate or concentration of IV fluids, change in feeds, or change in medication (steroids, etc)

**Treatment**

**HYPOglycemia Safety**
- Call provider for hypoglycemia: glucose < 60 mg/dL (For patients that cannot tolerate enteral intake or are NPO: glucose < 80 mg/dL)
- Follow [Diabetes: (Non-DKA) Hypoglycemia Management] for glucose < 80 mg/dL

**HYPERglycemia Safety**
- For glucose > 500 mg/dL x 1 or > 250 mg/dL x 2
- Check BOHB or urine ketones
- Call provider with glucose and ketone results to evaluate for DKA

**Diabetes Self-Management Education and Support**

**Consults**
- Endocrine (if not primary service)
- Nutrition
- Social work

**Discharge Appointment**
- Follow-up with Endocrinology 2-3 weeks after discharge

**Discharge Criteria**
- Home insulin regimen determined
- Demonstrated ability to independently administer insulin, monitor glucose and determine intervention, and prevent, identify and treat hypoglycemia, hyperglycemia and ketonuria.
- Primary care provider and endocrinology follow-up arranged within 3 weeks of discharge
- Prescriptions for insulin, glucagon, and other supplies provided
- Teaching completed

**Discharge Instructions**
- Call the diabetes nurses’ line at (206) 987-5452 to review blood glucose within 48 hours after discharge.
- Call the endocrinologist on call at (206) 987-2000 for urgent questions about blood glucose.
Inclusion Criteria
- Glucose LESS THAN 80 mg/dL
- Patient receiving subcutaneous insulin (by pump or injection) or insulin in parenteral nutrition

Exclusion Criteria
- Patient on IV continuous insulin infusions (including diabetic ketoacidosis (DKA))

Blood glucose less than 80 mg/dL identified

Patient safe to have simple carbohydrates administered orally or by feeding tube?

- NO
  - Loss of consciousness or seizure with glucose < 60 mg/dL?
    - ! Call a CODE BLUE
    - Continue glucose checks every 15 minutes
      - Contact provider for plan. Provider decides to treat?
        - YES
        - Treat hypoglycemia (oral)
          - Hold meal tray
          - Give simple carbohydrates
            - Age ≤ 5 years: 10 g (2.7 oz = 81 mL fruit juice)
            - Age > 5 years: 15 g (4 oz fruit juice)
          - Check glucose 15 minutes post intervention
          - Blood glucose 80 mg/dL or greater
          - Resume routine monitoring per physician order
            - Cover carbohydrates in meal. Do not correct glucose value after hypoglycemia treatment.
            - Return to Home
        - NO
          - Glucose < 80 mg/dL
          - Glucose < 80 mg/dL, consider placing IV

- YES
  - Treat hypoglycemia (IV, IM)
    - IV access
      - Administer D10W bolus
      - Check glucose 15 minutes post intervention
        - Blood glucose 80 mg/dL or greater
        - Resume routine monitoring per physician order
          - Cover carbohydrates in meal. Do not correct glucose value after hypoglycemia treatment.
          - Return to Home
      - Glucose < 80 mg/dL, consider placing IV
    - No IV access
      - Administer IM glucagon (may give up to 2 doses per episode)
      - Check glucose 15 minutes post intervention
        - Check glucose every 30 minutes for 2 hours. Consider starting IV
        - Blood glucose 80 mg/dL or greater
        - If more than one hour until next meal give 10-15 carb snack without insulin coverage
When Type 1 diabetes is suspected, order new onset labs to screen for complications and coexisting diseases (celiac disease, hypothyroidism), if not already done

- Glycosylated HbA1c
- Thyroxine Free
- Thyroid Stimulating Hormone
- Tissue Transglutaminase Antibody IgA
- Immunoglobulin A Level
- C Peptide
- Islet Cell Autoantibody Screen

ADA. I. Classification and Diagnosis. *Diabetes Care* 2013;36(supp 1)
Criteria for the Diagnosis of Diabetes

Fasting plasma glucose (FPG) ≥ 126 mg/dL*

OR

2-hr plasma glucose ≥ 200 mg/dL during an Oral Glucose Tolerance Test*

OR

In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥ 200 mg/dL*

OR

Consider if A1C ≥ 6.5% *

*Confirm by repeat testing.

ADA. 1. Classification and Diagnosis. Diabetes Care 2013;36(suppl 1)
Clinical changes that affect glucose include:

- Vomiting/diarrhea
- Change in dextrose rate or concentration of IV fluids
- Change in oral intake
- Changes in dosing or prescribing of medications that are likely to affect glucose, for example
  - Steroids
  - Tacrolimus, sirolimus
  - Cyclosporine
  - Beta-blockers can mask symptoms of hypoglycemia

Local Expert Opinion
Diabetes Self-Management and Support

During hospitalization, the patient and family need to be equipped to manage diabetes safely at home:

- Identify provider who will provide diabetes care after discharge
- Understand diagnosis of diabetes, glucose monitoring, and explanation of home glucose goals
- Define, recognize, treat, and prevent hyperglycemia and hypoglycemia
- When and how to take insulin
- Sick-day management
- Proper use and disposal of needles and syringes.

ADA. I. Classification and Diagnosis. Diabetes Care 2013;36(suppl 1)
Diabetes New Diagnosis (Non-DKA) Pathway
Citation and Approval

Approved August 2013

CSW Diabetes (Non DKA) Pathway Team:

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Evidence Ratings

This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children’s. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94.):

- Quality ratings are *downgraded* if studies:
  - Have serious limitations
  - Have inconsistent results
  - If evidence does not directly address clinical questions
  - If estimates are imprecise OR
  - If it is felt that there is substantial publication bias

- Quality ratings are *upgraded* if it is felt that:
  - The effect size is large
  - If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
  - If a dose-response gradient is evident

Guideline – Recommendation is from a published guideline that used methodology deemed acceptable by the team.

Expert Opinion – Our expert opinion is based on available evidence that does not meet GRADE criteria (for example, case-control studies).

**Quality of Evidence:**
- ☑️☑️☑️ High quality
- ☑️☑️☑️ Moderate quality
- ☑️☐☐ Low quality
- ☐☐☐☐ Very low quality

Guideline
Expert Opinion
Summary of Version Changes

- **Version 1 (5/21/2013):** Go live
- **Version 1.1 (8/20/2013):** Sick Day Management added
- **Version 1.2 (8/22/2013):** ED wording changes, clarified sick day lab orders
- **Version 2.0 (2/10/2014):** Sick Day Management: added a yellow alert triangle to for a remind to initiate
- **Version 3.0 (7/30/2014):** Established Diagnosis: added guidance and recommendations for unreliable oral intake (Post-op, NPO) or vomiting
- **Version 3.1 (10/9/2014):** Established Diagnosis: added basal insulin to Unreliable Oral Intake or NPO for clarity
- **Version 4.0 (3/30/2015):** Perioperative Management added
- **Version 4.1 (10/25/2016):** Added warning triangle to hypoglycemia page
- **Version 5 (1/6/2017):** Rapid-acting insulin to be given at 0300 (removed instructions to give only if glucose >300mg/dL)
Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

However, in view of the possibility of human error or changes in medical sciences, neither the authors nor Seattle Children’s Healthcare System nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such information.

Readers should confirm the information contained herein with other sources and are encouraged to consult with their health care provider before making any health care decision.
Bibliography

Literature Search
Studies were identified by searching electronic databases using search strategies developed and executed by a medical librarian, Susan Klawansky. Searches were performed in December 2012 in the following databases – on the Ovid platform: Medline and Cochrane Database of Systematic Reviews; elsewhere: Embase, Clinical Evidence, National Guideline Clearinghouse and TRIP. Retrieval was limited to 2007 (date of then-current ISPAD guideline) to date, humans, and English language. In Medline and Embase, appropriate Medical Subject Headings (MeSH) and Emtree headings were used respectively, along with text words, and the search strategy was adapted for other databases as appropriate. Concepts searched were type 1 diabetes mellitus and ketones, ketone bodies, keto acids, hyperglycemia, hospitalization, inpatients. All retrieval was further limited to certain publication types representing high order evidence. Additional articles have been identified by project team members and added to the retrieval.

Susan Klawansky, MLS, AHIP
May 16, 2013

Identification

255 records identified through database searching

14 additional records identified through other sources

Screening

269 records after duplicates removed

268 records screened

160 records excluded

Eligibility

108 records assessed for eligibility

65 full-text articles excluded,
20 did not answer clinical question
29 did not meet quality threshold
16 outdated relative to other included study

Included

43 studies included in pathway

Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535
This pathway was developed primarily based on:


This supporting literature was also cited:


