Diabetes non-DKA v7.3: Table of Contents

Treatment and Care

Diabetes: Emergency Department Workup v7.3

Approval & Citation | Summary of Version Changes | Explanation of Evidence Ratings

Inclusion Criteria
- Suspected DKA
  OR
- Suspected new diabetes

Exclusion Criteria
- None

New Diagnosis

Established Diagnosis

Sick Day

Hypoglycemia

Suspected DKA or Diabetes
- Use ED Suspected DKA order panel to
  - Rule out DKA
  - Test for new diabetes

DKA confirmed? — Yes → **Treat per DKA Pathway**
- Use ED Suspected DKA order panel

No

Diabetes Diagnosis Confirmed? — Yes → **Treat Diabetes (Non-DKA)**
- Use ED Diabetes (Non-DKA) order set
- If hyperglycemia with ketosis (BOHB ≥ 0.6 mmol/L or MODERATE to LARGE urine ketones), in consultation with endocrinologist *consider* ordering one-time "insulin for sick day -)" dose, following Sick Day Management Pathway

No

Not Diabetes

Return to TOC

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For questions concerning this pathway,
contact: DiabetesNonDKA@seattlechildrens.org

Last Updated: July 2021
Next Expected Review: March 2024

Diabetes Established Diagnosis (Non-DKA) v7.3

Approval & Citation

Explanation of Evidence Ratings

Summary of Version Changes

Inclusion Criteria
- Patient with established diagnosis of diabetes on subcutaneous insulin

Exclusion Criteria
- Diabetic ketoacidosis (DKA) (use instead DKA Pathway)
- New diabetes diagnosis requiring teaching for insulin use (use instead New Diagnosis Diabetes: (Non-DKA) Pathway)
- Continuous insulin infusion
- Intravenous insulin (for hyperkalemia, in TPN)
- Sliding scale insulin

Treatment

Order Established Diagnosis (Non-DKA) Admission order set

Insulin
- Basal insulin once or twice daily
- Rapid-acting insulin at each meal, snacks, bedtime, and 0300

Routine Monitoring
- HbA1c upon admission if not already done in past 2 months
- Check glucose before meals, at bedtime, and 0300 AND
  - 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)

HYPOglycemia Safety
- Call provider for hypoglycemia: glucose < 60 mg/dL (For patients that cannot tolerate enteral intake or are NPO: glucose < 70 mg/dL)
- Follow Diabetes: (Non-DKA) Hypoglycemia Management for glucose < 70 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 or Sick Day Management

Diet
- Modified Diet Carbohydrate-counted (insulin dependent)

Consult
- Endocrine (if not primary service)

Unreliable Oral Intake or NPO (e.g., Post-op, Young Age, Vomiting)

Intensive Monitoring
- Check glucose
  - Postop hourly for 2 hours after arrival to acute care unit
  - At least every 3 hours if NPO

Insulin
- Basal insulin per home regimen
- Rapid-acting insulin
  - Inject **after** meals when eating
  - Order every 3 hours PRN other than meal/snack/bed/night doses

Fluids
- Use fixed rate (no IV + PO)
- Consider dextrose-containing fluids (D5½NS or D5NS)
- Alternatively for patients with stable glucose, consider dextrose-free fluids (½ NS)
- Newly post-op:
  - Consider D5NS to prevent hyponatremia
  - Avoid added potassium
- Discontinue when oral intake is adequate

Discharge Criteria
- Primary care provider and endocrinology follow-up arranged within 3 months

Discharge Instructions
- Call diabetes nurses' line to review blood glucoses within 48 hours after discharge.
- Call the endocrinologist on call for urgent questions about blood glucose.

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Last Updated: July 2021
Next Expected Review: March 2024

Diabetes New Diagnosis (Non-DKA) v7.3

Approval & Citation | Summary of Version Changes | Explanation of Evidence Ratings

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

Treatment

Order New Diagnosis (Non-DKA) Admission order set

Establish New Diagnosis

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)

Diet
Modified Diet Carbohydrate-counted (insulin dependent)

HYPOglycemia Safety
- Call provider for hypoglycemia: glucose < 60 mg/dL (For patients that cannot tolerate enteral intake or are NPO: glucose < 70 mg/dL)
- Follow Diabetes: (Non-DKA) Hypoglycemia Management for glucose < 70 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 to review blood glucoses within 48 hours after discharge.
- Call the endocrinologist on call for urgent questions about blood glucose.

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Last Updated: July 2021
Next Expected Review: March 2024

Anesthesia/PACU Perioperative Diabetes (Non-DKA): Discharge to Home v7.3

Approval & Citation | Summary of Version Changes | Explanation of Evidence Ratings

Glossary

BG: blood glucose
Basal insulin: long acting subcutaneous insulin given 1-2 times a day to provide a steady dose of insulin throughout the day
Bolus insulin: rapid-acting subcutaneous insulin used to treat blood glucose above target or to cover carbohydrates in food
BOHB: beta hydroxybutyrate, used to measure ketones

Inclusion Criteria

- Patients with diabetes mellitus type 1 or 2 requiring a surgical procedure
- Treated in PACU to be discharged home

Exclusion Criteria

- Admitted to hospital (use other page)
- DKA (use DKA Pathway)

Glossary, Cont

Continuous IV insulin infusion: an insulin drip made by hospital pharmacy and administered via a hospital pump
Home insulin pump: provides a continuous subcutaneous infusion of insulin and bolus doses of insulin as programmed. Competent caregiver required for perioperative management.

PACU Phase 1 and 2

Orders

- Anesthesiologist has ordered PACU insulin and diabetes management using Anesthesia Diabetes (Insulin) Perioperative Plan
- Advance diet as tolerated per home dietary restrictions (if requested for extended stay, order carb-counted meal)
- **Consult endocrinologist for complex transition plans**

Routine Monitoring

- Check BG upon arrival to PACU then every 30 minutes until child wakes from anesthesia, then hourly until discharge to home

HYPOglycemia Safety

- If glucose < 80 mg/dL, call provider

HYPERglycemia Safety

- For glucose > 250 mg/dL
  - Notify anesthesia provider
  - Check BOHB
  - If BOHB ≥0.6 mmol/L, consult endocrine

Home Insulin?

Basal-bolus insulin | Insulin PUMP

Basal-Bolus Insulin

- Order one time insulin dose based on home regimen.
- Correct BG with rapid-acting insulin if it has been at least 3 hours since last rapid-acting dose

Insulin Pump

Patients arriving in PACU on insulin pump, or restarted:

- Patient/family verifies that insulin pump is infusing
- Until caregiver is managing insulin pump, order one time subcutaneous insulin dose.
- If BG >250 mg/dL and it has been at least 3 hours since last rapid-acting dose, correct with rapid-acting insulin
- Instruct patient/caregiver when to resume home routine insulin (change target insulin back to usual home setting)

Discharge Criteria

- Patient is ready to resume home insulin
- Patient is able to tolerate oral intake

Discharge Instructions

- Confirm with caregiver that insulin pump settings are accurate per home regimen
- Pamphlet Surgery and Diabetes
- Pamphlet Sick Day Management
- Advance diet as tolerated per home dietary restrictions
- Call the diabetes nurses' line or managing endocrine provider to review blood glucoses within 48 hours after discharge.
- Call the endocrinologist on call or managing endocrine provider for urgent questions about blood glucose.

Return to TOC

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Last Updated: Julyr 2021
Next Expected Review: March 2024

Anesthesia/PACU Perioperative Diabetes (Non-DKA): Discharge to Inpatient v7.3

Approval & Citation | Summary of Version Changes | Explanation of Evidence Ratings

Glossary

BG: blood glucose
Basal insulin: long acting subcutaneous insulin given 1-2 times a day to provide a steady dose of insulin throughout the day
Bolus insulin: rapid-acting subcutaneous insulin used to treat blood glucose above target or to cover carbohydrates in food
BOHB: beta hydroxybutyrate, used to measure ketones

Inclusion Criteria

- Patients with diabetes mellitus type 1 or 2 requiring a surgical procedure
- Treated in PACU to be admitted to hospital

Exclusion Criteria

- Discharged to home (use other page)
- DKA (use DKA Pathway)

Glossary, Cont

Continuous IV insulin infusion: an insulin drip made by hospital pharmacy and administered via a hospital pump
Home insulin pump: provides a continuous subcutaneous infusion of insulin and bolus doses of insulin as programmed. Competent caregiver required for perioperative management.

PACU Phase 1

Orders
- Anesthesiologist has ordered PACU insulin and diabetes management using Anesthesia Diabetes (Insulin) Perioperative Plan

Routine Monitoring
- Check BG upon arrival to PACU, then every 30 minutes until child wakes from anesthesia, then hourly for 4 hours after

HYPOglycemia Safety
- If glucose < 80 mg/dL, call provider

HYPERglycemia Safety
- For glucose > 250 mg/dL
  - Notify anesthesia provider
  - Check BOHB
  - If BOHB ≥0.6 mmol/L, consult endocrine

Continuous IV insulin infusion running?

NO → **Home insulin regimen?**

YES

On Continuous IV Insulin Infusion

1. Continue IV insulin infusion and admit to ICU

- OR -

2. Convert to basal-bolus insulin injections
- Anesthesiologist adjusts insulin infusion/glucose to maintain target BG 150 mg/dL
- Inpatient provider orders basal-bolus insulin; stop continuous insulin infusion in PACU
- Check BG within 30 minutes of stopping insulin infusion

- OR -

3. For patient on home pump, may convert to home insulin pump
- Competent caregiver required to be present at bedside
- Anesthesiologist adjusts insulin infusion/glucose to maintain target BG 150 mg/dL
- Inpatient provider ordering insulin enters insulin pump orders in the presence of caregiver and nurse if available
- After recovery from anesthesia AND after orders are entered, patient/family restarts insulin pump, stop continuous insulin infusion in PACU
- Check BG within 30 minutes of stopping insulin infusion

Home insulin regimen?

Basal-bolus | Pump

Continue Basal-Bolus Insulin

In PACU
- Order one time insulin dose based on home regimen. Use Humalog if home insulin type is not known.
- If BG >250 mg/dL and it has been at least 3 hours since last rapid-acting dose, correct with rapid-acting insulin

Orders for Admission
- Inpatient provider orders basal-bolus subcut insulin injections

Continue Home Insulin Pump

In PACU
- Caregiver verifies that insulin pump is infusing
- Until caregiver is managing insulin pump, correct with subcutaneous rapid-acting insulin if it has been at least 3 hours since last rapid-acting dose.

Orders for Admission
- Inpatient provider ordering insulin enters insulin pump orders in the presence of caregiver and nurse if available

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Last Updated: July 2021
Next Expected Review: March 2024

Hypoglycemia (Insulin-Related, Non-DKA) Management v7.3

Signs of hypoglycemia: pallor, sweating, shaking, irritability, confusion, or seizures

Inclusion Criteria
- Glucose LESS THAN 70 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))

! Notify Contact Provider for glucose < 60 mg/dL, OR cannot tolerate enteral intake with glucose < 70 mg/dL

Blood glucose less than 70 mg/dL identified

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

YES

NO

Loss of consciousness or seizure with glucose < 60 mg/dL?

! Call a CODE BLUE

NO

Continue glucose checks every 15 minutes Contact provider for plan. Provider decides to treat?

YES

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

Glucose < 70 mg/dL

Blood glucose 70 mg/dL or greater

Treat hypoglycemia (IV, IM)

IV access

Administer D10W bolus

Check glucose 15 minutes post intervention

Glucose < 70 mg/dL

Blood glucose 70 mg/dL or greater

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

Glucose < 70 mg/dL, consider placing IV

Blood glucose 70 mg/dL or greater

Resume routine monitoring per physician order
Cover carbohydrates in meal.
Do not correct glucose value after hypoglycemia treatment.

If more than one hour until next meal give 10-15 carb snack without insulin coverage

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For questions concerning this pathway, contact: DiabetesNonDKA@seattlechildrens.org

Last Updated: July 2021
Next Expected Review: March 2024

Insulin Sick Day Management for Diabetes (Non-DKA) v7.3

Approval & Citation | Summary of Version Changes | Explanation of Evidence Ratings

!
Reminder to initiate, BG > 250 mg/dL x 2 (or >500 mg/dL x 1) AND BOHB ≥ 0.6 mmol/L (or moderate to large urine ketones)

Inclusion Criteria
- Type 1 Diabetes (or at Endocrine attending discretion for CF-related or steroid-induced hyperglycemia)
  AND
- Moderate to large urine ketones OR Blood BOHB ≥ 0.6 mmol/L

Exclusion Criteria
- Diabetic ketoacidosis (DKA) (use instead DKA Pathway)
  - Intravenous insulin

!
Watch for signs of DKA, evaluate if present

BOHB ≥ 0.6 mmol/L OR moderate to large urine ketones

↓

Call Provider to evaluate for Diabetic Ketoacidosis (DKA)
Has provider ordered Sick Day Management?

NO → **Provider consider insulin dose adjustment**

YES ↓

Sick Day Management

↓

Treatment
- Continue basal and rapid-acting insulin. Rapid-acting can be given for glucose correction every 3 hours (injection) or 2 hours (pump)
- Maintain good hydration
  - Give fluids, may require alternating carbohydrate-free and carb-containing fluids
  - Consider IV fluids if patient is unable to tolerate PO
- Do not use glucagon for hypoglycemia while ketones present

↓

Monitoring
- Check BG and BOHB every 3 hours (injection) or 2 hours (pump)
  - Use capillary POC BOHB where available, or stat serum BOHB
  - If serum BOHB results unavailable after 30 minutes, check urine ketones
- Watch for signs of DKA (vomiting, persistent ketones not decreasing); evaluate for DKA (pH, electrolytes, BOHB) if signs are present

BOHB <0.6 mmol/L* OR NEGATIVE to SMALL urine ketones within previous 1 hour	BOHB 0.6-1.5 mmol/L* OR MODERATE urine ketones within previous 1 hour	BOHB >1.5 mmol/L* OR LARGE urine ketones within previous 1 hour
↓	↓	↓
Insulin dose = insulin to correct glucose + insulin to cover carbs	Insulin dose = **(1.5x**(insulin to correct glucose)) + insulin to cover carbs	Insulin dose = **(2x**(insulin to correct glucose)) + insulin to cover carbs

↓

Call inpatient provider to discontinue Sick Day Management
(ED Sick Day calculator will discontinue after each one-time insulin dose is used)

Discharge Criteria
- Sick day management RN teaching and education, in collaboration with Diabetes Nurse Educator

To calculate dose
- For subcutaneous insulin, use MAR calculator
- For insulin pump, see Sick Day Insulin Pump Job Aid

* If BOHB and urine ketone results differ, base correction dose on BOHB

For elevated ketones and normal glucose, consider:
- Administer IV fluids to clear the ketones
- Add dextrose to IV fluids or give juice to increase glucose so more insulin can be given
- Verify plan with primary team and/or endocrine

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For questions concerning this pathway, contact: DiabetesNonDKA@seattlechildrens.org

Last Updated: July 2021
Next Expected Review: March 2024

New Diagnosis Laboratory Evaluation

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 2. Classification and diagnosis of diabetes: standards of medical care in diabetes – 2018. Diabetes Care 2018;41(Suppl. 1):S13–S27

Return to New Diagnosis

New Diagnosis Laboratory Evaluation

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 of ≥200 mg/dL*

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 2. Classification and diagnosis of diabetes: standards of medical care in diabetes – 2018. Diabetes Care 2018;41(Suppl. 1):S13–S27

Return to New Diagnosis

Clinical Changes That Can Affect Glucose

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

Expert opinion

Return to New Diagnosis

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 results
- 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 2. Classification and diagnosis of diabetes: standards of medical care in diabetes– 2018. Diabetes Care 2018;41(Suppl. 1):S13–S27

Return to New Diagnosis

Perioperative Recommendations

Use a glycemic target of 90-180 mg/dL perioperatively for surgeries, excluding CABG. [LOE: Guideline (Jefferies 2018, Diabetes Canada Clinical Practice Guide 2018)]

Contraindications to intraoperative insulin pumps include MRI, CT, and nuclear medicine scans; cardiac catheterization or AICD/pacemaker implantation; and therapeutic radiation oncology. Xray or fluoroscopy recommendations vary and pump may be covered with lead apron or be removed. Electrocautery is a theroretic risk, although pumps have been used safety in the presence of electrocautery. Ask patients if they have metal needles (Minimed Sure-T). [LOE: Guideline (Jefferies 2018)]

In a systematic review, authors were interested in the effects of Enhanced Recovery Surgery (ERAS), an evidence-based multimodal surgical pathway, on diabetic patients. No studies met inclusion criteria (Albalawi, 2017).

Return to TOC

Monitoring Parameters and Backup Measures

All patients on Sick Day Management will have the following labs at least every 3 hours for patients on injections, and every 2 hours for patients on a pump:

- Blood glucose
- BOHB (capillary POC or STAT serum)

NOTE: Send BOHB and blood glucose to the lab in a green top tube.

If not resulted in 30 minutes, proceed with backup measures:

- Fingerstick glucose
- Urine ketones

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Sick Day Dosing

The 2018 ISPAD Sick Day Guideline recommends sick day dosing based on expert consensus

- For Elevated BG with an absence or only small amount of ketones: give 5-10% of the total daily dose of insulin (~0.05-0.1 U/kg) as short or rapid acting insulin, repeat every 2-4h according to BG response and clinical condition.
- For Elevated BG with moderate or large ketones: give 10-20% of the total daily dose of insulin (~0.1-0.2 U/kg) as short or rapid-acting insulin, repeat every 2-4h according to BG response and clinical condition.

No evidence on magnitude of benefit for various dosing alternatives was cited [LOE: Guideline (Laffel 2018).

To make it easier for families to calculate this dose at home, our practice has adapted this recommendation to multiply the glucose correction by 1.5 or 2 based on ketones. This dosing strategy was introduced for inpatients in 2013.

Return to Sick Day

Diabetes (Non-DKA) Approval & Citation

Approved by the CSW CSW Diabetes (Non-DKA) Pathway team for March 2019 go-live

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Retrieval Website: http://www.seattlechildrens.org/pdf/diabetes-non-dka-pathway.pdf

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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

Quality of Evidence:

✪✪✪✪ High: The authors have a lot of confidence that the true effect is similar to the estimated effect
✪✪✪○ Moderate: The authors believe that the true effect is probably close to the estimated effect
✪✪○○ Low: The true effect might be markedly different from the estimated effect
✪○○○ Very low: The true effect is probably markedly different from the estimated effect
Guideline: Recommendation is from a published guideline that used methodology deemed acceptable by the team
Expert Opinion: Based on available evidence that does not meet GRADE criteria (for example, case-control studies).

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To Bibliography

Summary of Version Changes

- **Version 1.0 (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 for a reminder 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 5.0 (1/6/2017):** Rapid-acting insulin to be given at 0300 (removed instructions to give only if glucose >300mg/dL)
- **Version 5.1 (4/9/2018):** Added postoperative inpatient provider ordering insulin
- **Version 5.2 (9/12/2018):** Expanded availability of point of care BOHB test
- **Version 6.0 (3/25/2019):** Updated literature review and implemented sick day for insulin pump
- **Version 6.1 (4/20/2020):** Clarified guidance for sick day when glucose is normal
- **Version 7.0 (10/3/2020):** Changed glucose threshhold from 80mg/dL to 70mg/dL for Hypoglycemia and aligned verbiage to correspond with Epic.
- **Version 7.1 (10/7/2020):** Modified glucose threshold changes for Hypoglycemia
- **Version 7.2 (11/6/2020):** Corrected glucose threshold for Hypoglycemia
- **Version 7.3 (7/22/2021):** Removed requirement for unused IV during sick day, merged independent non-DKA algorithms into one document, and added a Table of Contents.

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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.

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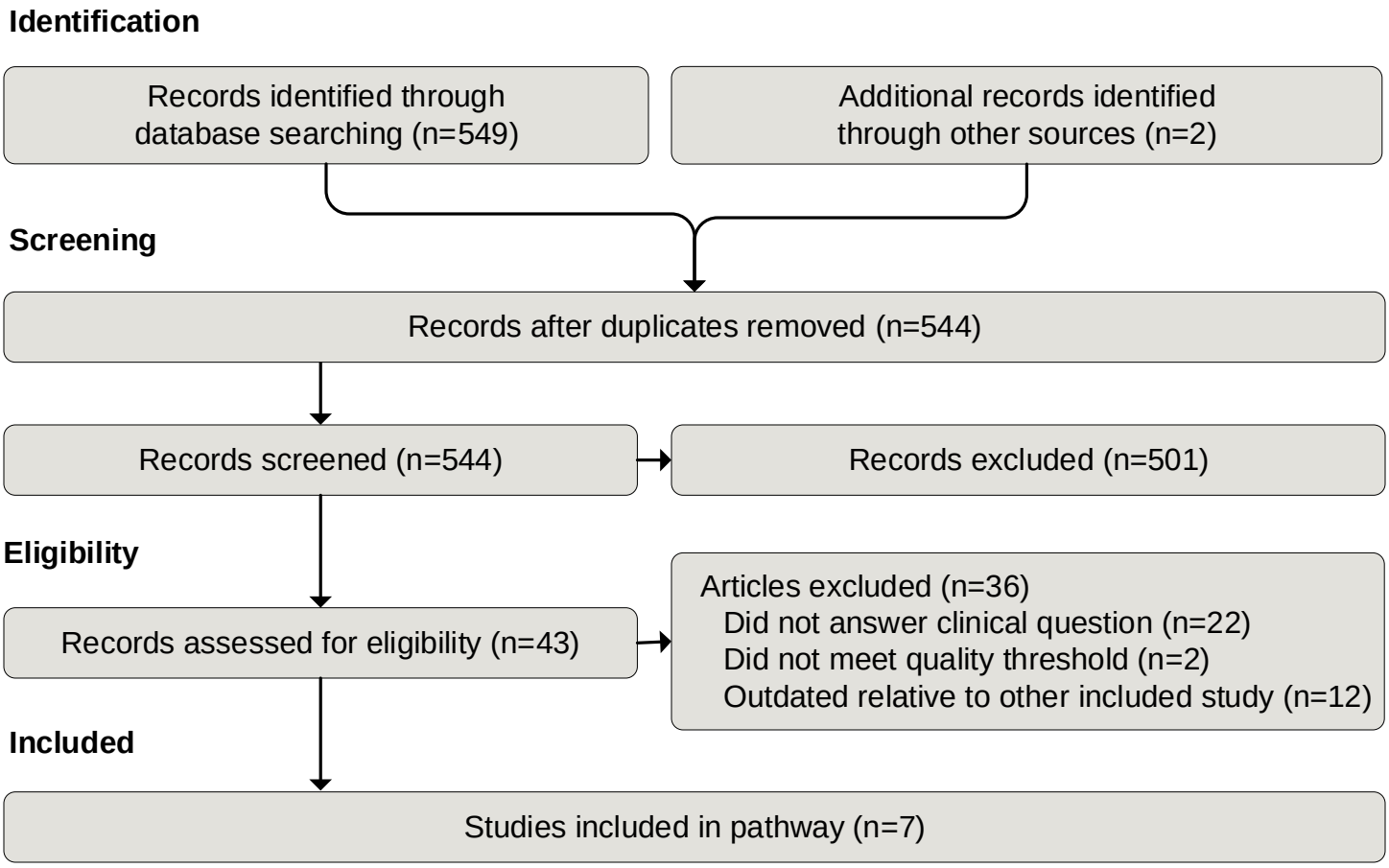
Bibliography

Studies were identified by searching electronic databases using search strategies developed and executed by a medical librarian. Searches were performed in June 2018. The search strategy used controlled subject indexing, where available, as well as text words to capture literature on the following concepts: diabetes mellitus and insulin, limited to pediatrics; diabetes mellitus and surgical procedures, sick day management, or inpatients; or, insulin infusion pumps or continuous glucose monitoring. All concepts were further limited to synthesis-level records using a standard Clinical Effectiveness filter. Searches were executed in Ovid Medline, Embase, Cochrane Database of Systematic Reviews, National Guideline Clearinghouse and TRIP. Retrieval was limited to English and records available from 2012 to date.



Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535

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