Riverside Health

Optimizing Diabetes Care

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Today's Agenda

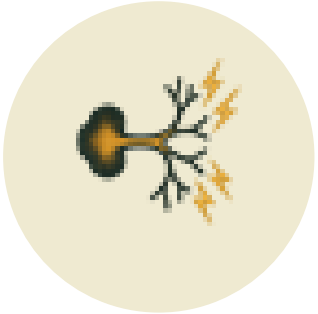
- Evidence-Based Approaches for Managing Uncontrolled Diabetes in Pre and Postoperative Settings
- Traditional Versus Advanced Insulin Delivery Methods
- Application of Guidelines for Optimal Glycemic Control in Surgical Patients
- Developing Individualized Care Plans Incorporating Modern Insulin Delivery Technologies

Evidence-Based Strategies for Managing Uncontrolled Diabetes in Preoperative and Postoperative Care

Assessing Risk Factors and Complications

Poor Glycemic Control

Elevated HbA1c (>8%)



Diabetic Neuropathy

Peripheral and autonomic intraoperative hemodynamic instability.

Nephropathy

Renal impairment

Cardiovascular Disease

Comorbid heart disease

Preoperative Glucose Monitoring Protocols

General Target

80–180 mg/dL (4.4–10.0 mmol/L) for the overall perioperative period.

Pre-Surgery Target

Closer to 100–180 mg/dL (5.6–10.0 mmol/L) within 4 hours of surgery for non-critically ill patients.

Monitoring Glucose

Adjust frequency by surgery type and patient status.

Use continuous or point-of-care testing to limit hypo- and hyperglycemia.

Outcome Impact

Standardized protocols associate with a 22% reduction in complications.

Preoperative interventions

Optimize insulin regimens, consider short-acting basal analogs, and align nutrition plans to stabilize glucose before surgery.

Medication Management

- Metformin is usually held the morning of or 1 day before surgery to prevent lactic acidosis
- SGLT-2 Inhibitors are held 1-3 days before surgery due to DKA risk
- Sulfonylureas hold morning of surgery
- Insulin Basal insulin may continue but all short acting insulin are adjusted or held.
- GLP-1 Hold 1 week before surgery

Postoperative Guidance

Prevent	Prevent hypoglycemia and hyperglycemia
Reduce	Reduce complications
Ensure	Ensure stability – electrolyte balance
Frequent	Frequent Monitoring glucose meters every hour depending on complexity of surgery or patient condition.

- Resume oral agents when appropriate following the transition from intravenous to subcutaneous insulin.
- Manage training on self-management and medication use.
- Arrange follow-up appointments with the PCP or endocrinologist for long-term management.

Postoperative Guidance

- **Insulin remains the most effective treatment for hyperglycemia in hospitalized patients.**

- **Noninsulin therapies are not recommended for patients who are:**
  - Not eating
  - Dehydrated with renal failure
  - Receiving enteral or parenteral nutrition.

Evidence-Based Glycemic Stabilization

Postoperative strategies

Use tight glucose control with IV insulin

Clinical impact

Meta-analyses show tight control

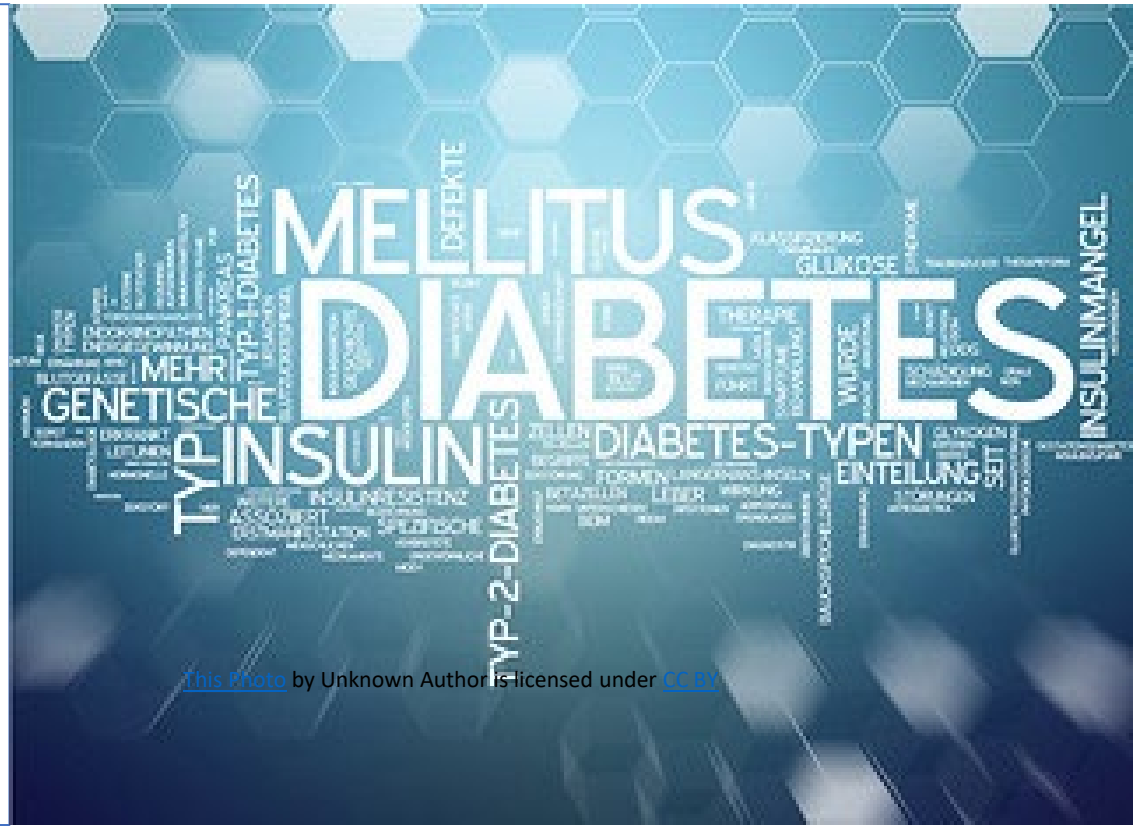
Best outcomes

Combine pharmacologic optimization with nutrition

Traditional Insulin Delivery Methods Compared to Advanced Insulin Delivery Methods

Terminology

- Diabetes technology is the term used to describe the hardware and software used to assist with self-management, ranging from lifestyle modifications to glucose monitoring and automated therapy adjustments.



Traditional Insulin Injections

How it works - Multiple daily subcutaneous injections of basal and bolus insulin to mimic physiologic secretion.

Advantages - Widely accessible, low equipment needs, flexible dosing across settings.

Limitations - Injection pain, lipo-hypertrophy risk, variable absorption, glycemic variability.

Success factors - Adherence, accurate dosing and timing, and rotation of injection sites.

Advanced Delivery Methods

- Blood glucose monitoring (BGM) and continuous glucose monitoring (CGM) systems.
- Advancements in diabetes technology now feature automated insulin delivery (AID) systems that utilize CGM-guided algorithms to modulate insulin delivery.
- The use of connected insulin pens alongside diabetes self-management support software.

Various Delivery Methods

Insulin delivery methods include syringes, pens, inhalers, a range of devices, and insulin pumps.

Pump Systems

Pump / System	Tubing	AID (automatic adjustment)	Primary CGM partner(s)	Key strengths for users
Omnipod 5	Tubeless	Yes (hybrid closed loop)	Dexcom G6/G7	No tubing, very discreet, flexible targets, phone control on some phones
Omnipod DASH	Tubeless	No (manual pump)	None (no direct AID)	Simpler patch pump, good if you want tubeless but no algorithm
Tandem t:slim X2 (Control-IQ)	Tubed	Yes (hybrid closed loop)	Dexcom G6/G7	Strong algorithm, customizable settings, touchscreen, rechargeable
Medtronic MiniMed 780G	Tubed	Yes (advanced hybrid closed loop)	Guardian 4 CGM	Very “hands-off” for many, strong auto-corrections, all-in-one ecosystem

Pump Systems continued

Medtronic MiniMed 770G/630G	Tubed	770G: AID, 630G: suspend only	Guardian CGM	Good if already in Medtronic ecosystem or insurance favors it
Beta Bionics iLet	Tubed	Yes (adaptive “bionic pancreas”)	Dexcom G6 / others per config	Very minimal carb math, algorithm learns you, less manual tweaking
Sequel twiist AID system	Tubed	Yes (AID)	(Varies; emerging)	Newer AID system in U.S. portfolio, aimed at flexibility and automation

Pump Systems continued

Closed-loop integration

Pairs with insulin pumps to automate dosing for steadier control.

Clinical outcomes

Trials show HbA1c reductions of ~0.4–0.7% and ~40% fewer hypoglycemia events.

Functionality and Benefits of Insulin Pumps

Features

Insulin pumps offer programmable basal rates, bolus dosing, and integration with continuous glucose monitoring.

Traditional injections require manual dosing and fixed schedules.

Challenges

Pumps can be expensive and require regular maintenance.

Device malfunctions can occur.

Insulin injections may result in fluctuating glucose levels and an increased risk of hypoglycemia.

Functionality and Benefits of Insulin Pumps

Benefits

Pumps provide improved glycemic control, fewer hypoglycemic episodes, and an enhanced quality of life.

Injections are cost-effective and require less technology training

Patient Suitability

Insulin pumps are well-suited for motivated individuals with Type 1 diabetes who desire greater flexibility in their management.

Conversely, injections may be more appropriate for patients who favor simplicity or have limited access to technological devices.

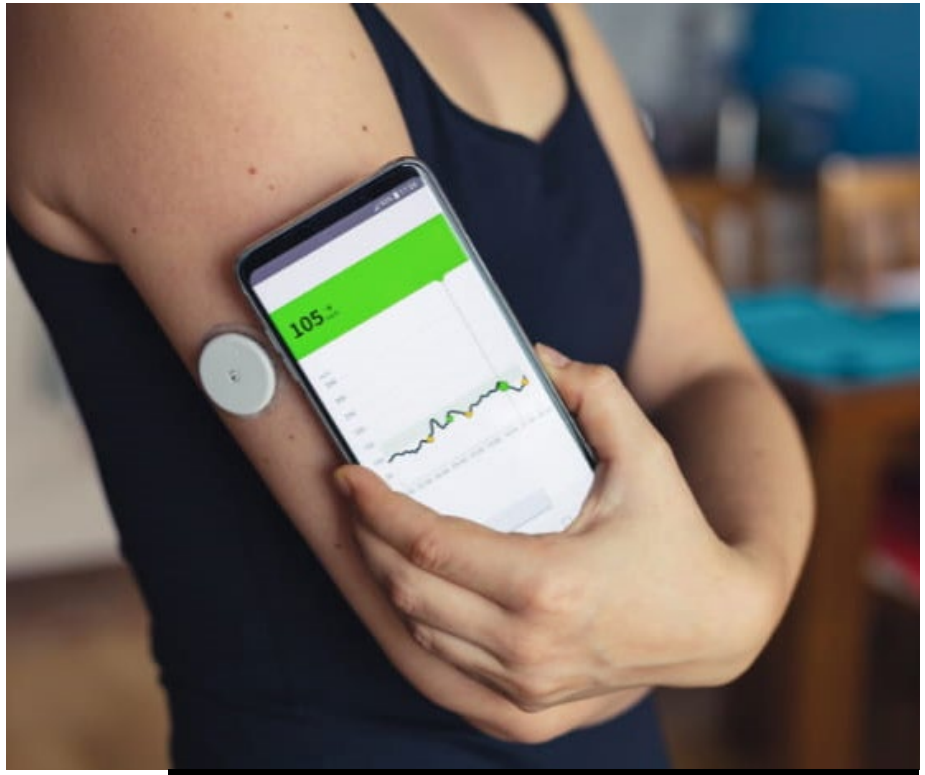
Continuous Glucose Monitoring: Features and Outcomes

Real-time insights

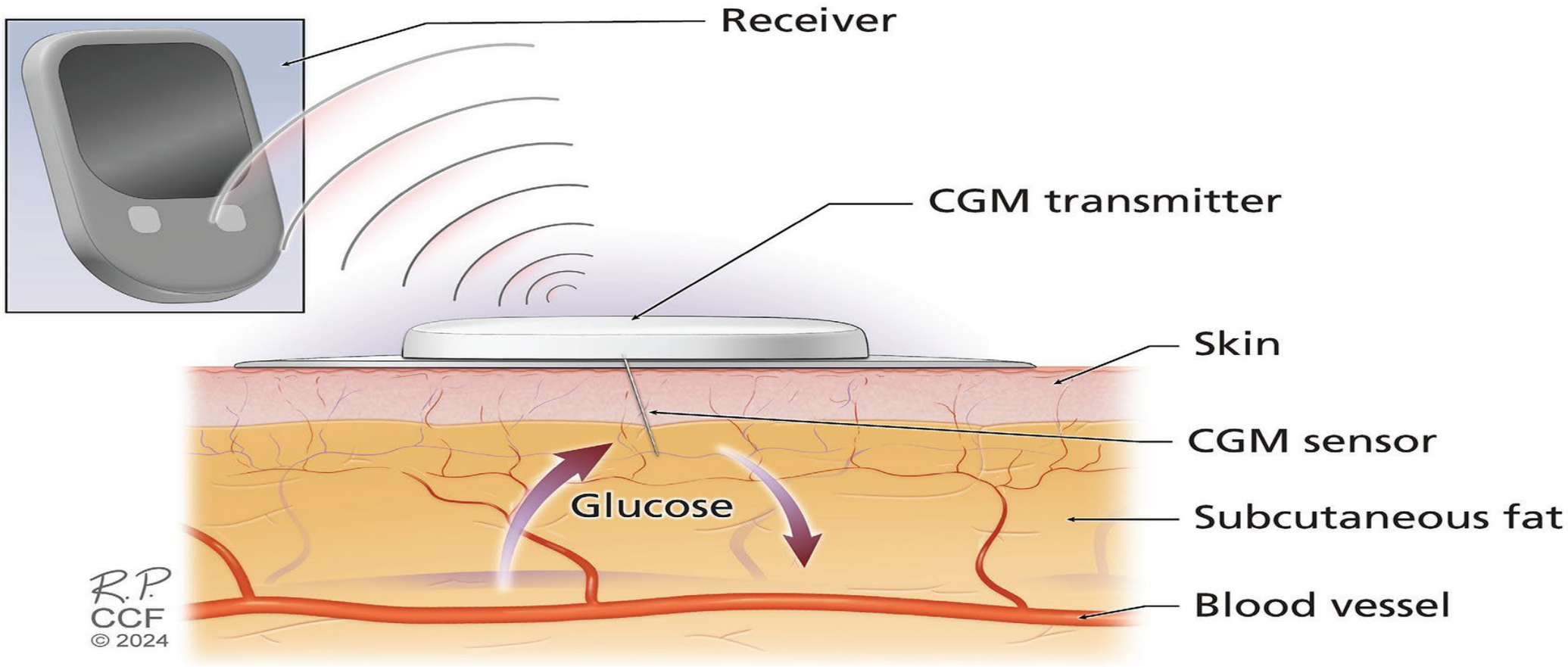
CGMS delivers continuous glucose data and trend arrows for proactive adjustments.

Smart alerts

Customizable thresholds notify impending highs or lows to prevent excursions.



Continuous Glucose Monitor Placement



CGM Brands, Availability

Brand	Type	Availability	Alarm
FreeStyle Libre 2 Plus	14 days	Prescription	Yes
FreeStyle Libre 3 Plus	15 days	Prescription	Yes
Dexcom G6	10 days	Prescription	Yes
Dexcom G7	10-15 days	Prescription	Yes
Eversense 365	365 days	Prescription	Yes
Guardian 4	4-7 days	Prescription	Yes
Dexcom Stelo	15 days	OTC	No
Abbott Lingo	15 days	OTC	No
FreeStyle Libre Pro	14 days	In Office	No
Dexcom G6 Pro	14 days	In Office	No

CGM Device Interfering Substances

- **Medication – Systems Affected – Effect**
- **Acetaminophen – – –**
- >4 g/day – **Dexcom G6**, **Dexcom G7** – Elevated sensor glucose readings compared to actual levels
- Any dose – **Medtronic Guardian 4** – Elevated sensor glucose readings compared to actual levels
- **Ascorbic acid (vitamin C) – – –**
- >500 mg/day – **FreeStyle Libre 2**, **FreeStyle Libre 3** – Elevated sensor glucose readings compared to actual glucose
- >1,000 mg/day – **FreeStyle Libre 2 Plus**, **FreeStyle Libre 3 Plus** – Elevated sensor glucose readings compared to actual glucose

CGM Device Interfering Substances

- Hydroxyurea
- Mannitol (intravenously or as peritonealdialysis solution)
- Sorbitol (intravenously or as peritoneal dialysis solution)

Optimal Glycemic Control in Surgical Patients

Glycemic Targets

Aim 100–180 mg/dL; individualize by risk; prioritize hypoglycemia avoidance; continuous perioperative monitoring.

Preoperative Optimization

Assess HbA1c; adjust therapies; address comorbidities; reinforce education and perioperative plans.

For adult patients with diabetes undergoing elective surgical procedures, we suggest targeting preoperative hemoglobin A1c (HbA1c) levels <8% (63.9 mmol/mol) and BG concentrations 100-180 mg/dL (5.6-10 mmol/L).

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Insulin Protocols

Continue basal; IV insulin for major surgery; adjust doses to intake; standardized orders reduce errors.

Clinical Impact

Reduced infections and CV events; shorter stays; fewer readmissions; improved survival.

ADA Recommendations

- People with diabetes, wearing personal CGM, should be continued when clinically appropriate during hospitalization, with glucose measurements for insulin.
- Hypoglycemia assessment and treatment per hospital protocol.
- Continue use of insulin pump or AID in people with diabetes who are hospitalized when clinically appropriate.

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Multidisciplinary Strategies for Target Glucose

Endocrinologists

Lead glycemic management, set individualized targets, and oversee insulin titration (hospital protocol).

Surgeons

Coordinate surgical timing with glucose control, communicate perioperative risks, and ensure protocols are followed during procedures

Multidisciplinary Strategies for Target Glucose

Anesthesiologists

Monitor intraoperative glucose, adjust medications as needed, and manage acute glycemic fluctuations during surgery.

Diabetes Educators

Provide patient education, reinforce protocol adherence, and support staff training for consistent perioperative diabetes care.

Endocrine Society Recommendations

Prior to Prescribing Insulin Pump Therapy

- Assess patient's mental and psychological status
- Review prior adherence to diabetes self-care
- Evaluate willingness and interest in device use
- Confirm availability for follow-up visits

Individualized Care Plans with Modern Insulin Technologies

Patient Factors

Includes diabetes type, age, lifestyle, cognitive ability, and manual dexterity.

Socioeconomic Factors

Assesses insurance coverage, out-of-pocket costs, and access to technology.

Clinical Criteria

Considers glycemic control history, frequency of hypoglycemia, and previous device experience.

Potential Barriers

Includes motivation, health literacy, and support systems

20%

reduction in emergency visits with technology-enabled diabetes care

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ADA Recommendations

- Automated Insulin Delivery (AID) systems are recommended as the preferred method with type 1 diabetes.
- Nevertheless, the choice of an AID system should be tailored to each person's unique circumstances, preferences, and requirements.

Key Updates: The 2026 ADA Recommendations for Diabetes Technology

Expanded guidelines for Continuous Glucose Monitors (CGM) and Automated Insulin Delivery (AID) systems promote earlier, broader adoption for a wider patient population, including Type 2 diabetes.

Expanded Recommendations for Continuous Glucose Monitoring (CGM)

Recommended for a Wider Patient Group

CGM is now recommended for those on insulin or non-insulin therapies that risk hypoglycemia.

Emphasis on Early & Continuous Use

Use is recommended at diabetes onset and should be as close to daily as possible.

Updated Device Categories

- Prescribed Real-Time CGM
- Over-the-Counter CGM

Broader Application of Automated Insulin Delivery (AID) Systems

AID is Now the Preferred Method for Type 2 Diabetes

AID is the preferred insulin delivery method for adults and children with T2D on intensive insulin.

Considered for Basal Insulin Users

AID systems can be considered for T2D patients on basal-only insulin not meeting glycemic goals.

Key Barriers to Access Removed

These are not required for AID initiation.

NotebookLM

Endocrine Society Recommendations

The Endocrine Society recommends that healthcare providers maintain insulin pump therapy for hospitalized patients with either type of diabetes, provided the facility has established protocols for assessing patient eligibility and ensuring proper monitoring and safety measures.

Designing Personalized Care Pathways

Optimization

Align insulin adjustments, education, and tech setup to patient risk and device use.

Monitoring

Set glucose checks, titration steps, and clear contingency plans for hypo/hyperglycemia.

Outcomes & Value

Tailored pathways reduce complications and readmissions, improve satisfaction, and speed recovery.

References

- American Diabetes Association Professional Practice Committee. (2026). 7. Diabetes technology: Standards of care in diabetes—2026. *Diabetes Care*, *49*(Supplement 1), S150–S165.

- Korytkowski, M. T., Muniyappa, R., Antinori-Lent, K., Donihi, A. C., Drincic, A. T., Hirsch, I. B., Luger, A., McDonnell, M. E., Murad, M. H., Nielsen, C., Pegg, C., Rushakoff, R. J., Santesso, N., & Umpierrez, G. E. (2022). Management of hyperglycemia in hospitalized adult patients in non-critical care settings: An Endocrine Society clinical practice guideline. *The Journal of Clinical Endocrinology & Metabolism*, *107*(8), 2101–2128. https://doi.org/10.1210/clinem/dgac278