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CARDI·OH
Ohio Cardiovascular and Diabetes Health Collaborative

Addressing Common Barriers to Insulin Initiation and Use

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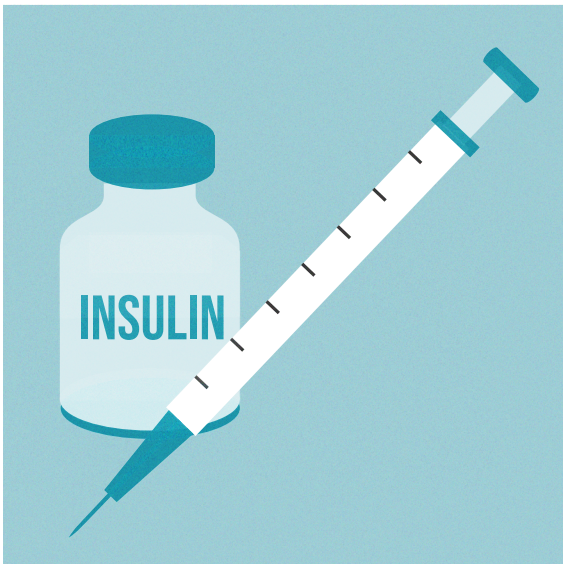

Poor glycemic control in individuals with type 2 diabetes (T2D) may be due to delayed initiation of insulin (initiation inertia), lack of timely dose adjustment (titration inertia), and delayed insulin regimen intensification (intensification inertia).

Studies show that insulin initiation and intensification are often inappropriately delayed for several years.[1] Numerous barriers to insulin initiation and use have been identified both from the patient perspective and the health care provider perspective. There are also system-level barriers that compound this issue. The following tables outline common barriers and possible solutions to those barriers.[1-3]

Provider Barriers

Common provider barriers to the initiation and effective use of insulin in clinical practice include clinical inertia and provider comfort with insulin prescribing and use (see Additional Resources at the end of this document).

Table 1. Provider Barriers and Proposed Solutions

<table>
<tr><th>Barrier</th><th>Proposed Solutions</th></tr>
<tr><td>Clinical inertia</td><td>

Schedule diabetes-focused visits.
Develop a personalized care plan with patient buy-in.
Ensure timely follow-up to titrate medications and offer education.
Utilize team-based care models and engage other providers/educators in patient care.
Establish standardized protocols to ensure blood glucose readings and A1C are available for provider and patient review.

</td></tr>
<tr><td>Uncertainty with ordering testing supplies

*If a 90-day supply cannot be filled, the pharmacy can fill 30 days, and the remaining 60 days would be automatically added to available refills.</td><td>

Order glucometer kit for new patients, including lancing device.
Order test strips and lancets in quantities of 100 x number of times per day the patient is testing.
Example: Testing three times daily, order 300 for a 90-day supply.*
Consider creating standardized order sets for testing supplies if electronic medical record allows.
Consider ordering continuous glucose monitors (CGM) for most patients who require insulin (See Additional Resources).

</td></tr>
<tr><td>Uncertainty with types of insulin</td><td>
Ensure orders for insulin contain the correct concentration, dosing in units, and an appropriate quantity for 30 or 90 days.
<table>
<tr><th>Type of Insulin</th><th>Onset of Action</th><th>Peak Action</th><th>Duration of Action</th></tr>
<tr><td>Ultra-Rapid-Acting
(faster-acting insulin aspart, insulin lispro-aabc)</td><td>2-15 minutes</td><td>30-60 minutes</td><td>2-4 hours</td></tr>
<tr><td>Rapid-Acting
(aspart, glulisine, lispro)</td><td>10-15 minutes</td><td>1-2 hours</td><td>2-4 hours</td></tr>
<tr><td>Short-Acting
(regular)</td><td>30 minutes</td><td>2-3 hours</td><td>3-6 hours</td></tr>
<tr><td>Intermediate-Acting
(neutral protamine hagedorn [NPH])</td><td>2-4 hours</td><td>4-12 hours</td><td>12-18 hours</td></tr>
<tr><td>Long-Acting
(glargine)</td><td>3 hours</td><td>No peak</td><td>16-24 hours</td></tr>
<tr><td>Ultra-Long-Acting
(glargine U-300, degludec)</td><td>6 hours</td><td>No peak</td><td>36 hours</td></tr>
</table>
</td></tr>
<tr><td>Uncertainty initiating basal and mealtime insulin</td><td>

Initiate once daily basal insulin first and titrate before considering bolus insulin.
If using bolus insulin, use lowest effective dose and frequency. Use set mealtime dosing to avoid confusion from sliding scales or carbohydrate counting. Sliding scale and carbohydrate counting may be required for type 1 diabetes patients.
Utilize guideline directed dosing (see Additional Resources).[4,5]

</td></tr>
</table>

Table 1. Provider Barriers and Proposed Solutions (Cont'd)

<table>
<tr><th>Barrier</th><th>Proposed Solutions</th></tr>
<tr><td>Uncertainty with ordering pen needles (for insulin pens) or syringe/ needles (for vials)</td><td>

Order in quantities of 100 x number of injections per day.
Example: Taking insulin twice daily, order 200 for a 90-day supply.
Shortest needles are safe, effective, and less painful, and should be the first-line choice for all patients.[6-9]

<table>
<tr><th>Needle Size</th><th>Available Gauge</th><th>Notes</th></tr>
<tr><td>4mm</td><td>32 gauge</td><td>Smallest, thinnest needle (nano)</td></tr>
<tr><td>5mm-6mm</td><td>31 or 32 gauge</td><td>Mini</td></tr>
<tr><td>8mm</td><td>31 gauge (average)</td><td>Short and thin but requires skin pinching</td></tr>
<tr><td>10mm-12mm</td><td>29-31 gauge</td><td>Do not use in thinner patients</td></tr>
</table>
<table>
<tr><th>Syringe Volume</th><th>Max Units Per Dose</th><th>Order when dose is...</th></tr>
<tr><td>3/10 mL (0.3 mL)</td><td>30</td><td>30 units or less</td></tr>
<tr><td>1/2 mL (0.5 mL)</td><td>50</td><td>31-50 units</td></tr>
<tr><td>1 mL</td><td>100</td><td>51-100 units</td></tr>
</table>
*Insulin pens generally come in a box of five. Some pharmacies will not break boxes so rounding may be required to the nearest multiple of five pens.
</td></tr>
<tr><td>Uncertainty calculating day's supply when ordering insulin</td><td>
1. Review concentration of insulin (U-100, U-200, U-300, U-500).
2. Review size of pen or vial (pen usually 3 mL, vial usually 10 mL).
3. Calculate number of units required for a 90-day supply, if allowable.
a. Multiple daily dose (in units) x 90 days.
4. Calculate number of mL needed for 90 days.
a. Divide 90-day supply units by units per pen/vial (units per pen/vial calculated by multiplying concentration x volume).
b. Round mL to the nearest pen/vial size.

Example: 80 units of insulin glargine U-100 daily (3 mL insulin pen).
a. Number of units for a 90-day supply: 80 units x 90 days = 7,200 units
b. Number of mL needed for 90-day supply: 7,200 units / (100 units x 3mL) = 24 pens
</td></tr>
</table>

Patient Barriers

Patient barriers to insulin initiation and use can be addressed in the following ways: motivational interviewing techniques to understand patient concerns and treatment goals, targeted education and goal setting, and shared decision making to create patient-specific plans and engage patients in their care (see Additional Resources).

Table 2. Patient Barriers and Proposed Solutions

Barrier	Proposed Solutions
Cost	▪ Use preferred formulary agents, medication assistance programs, cost-effective alternatives from certain pharmacies (e.g., insulin R or N, NPH, insulin aspart, 340B pharmacy program).
Insulin as a personal failure	▪ Educate patient that T2D progresses over time with a decrease in beta cell function and decreased insulin production, so treatment needs change and may require insulin injection.
Fear of injection	▪ Educate on small size of needles. Show needles and insulin pens to patient for reference. ▪ Have patient do an injection with normal saline. ▪ Connect patient with psychologist who is knowledgeable about diabetes to address needle phobia. ▪ In severe cases, consider inhaled insulin. ▪ Consider enlisting caregiver to administer injections and attend visits with patient. ▪ Consider referral for alternative insulin delivery options such as insulin patch, insulin pump, inhaled insulin or auto-shield needles.[10]
Misconceptions about insulin	▪ Have patient explain what they know and what concerns they have regarding insulin. ▪ Educate on newer, safer insulins that offer lower hypoglycemia risk. ▪ Offer stories of how insulin has helped other patients by improving blood glucose levels, glucose control, energy levels, and overall quality of life. ▪ Discuss strong evidence that insulin prevents complications through glucose control.

Table 2. Patient Barriers and Proposed Solutions (Cont'd)

Barrier	Proposed Solutions
Fear of hypoglycemia	▪ Educate on the 15-15 Rule (See Additional Resources). ▪ Counsel on ways to avoid hypoglycemia: consistency with diet, dosing, and adjusting for exercise. ▪ Describe newer insulins (insulin analogues cause less hypoglycemia than NPH or regular insulin; ultra-long-acting insulin demonstrates less hypoglycemia versus glargine or detemir) and regimens that offer lower hypoglycemia risk. ▪ Discontinue concomitant medications with increased hypoglycemia risk (e.g., sulfonylureas, meglitinides). ▪ Educate on how continuous glucose monitoring helps reduce hypoglycemia risk.[4,11] ▪ Consider flexible meal dosing for select patients.
Fear of weight gain	▪ Suggest mobile app-based interventions (e.g., MyFitnessPal, MyNetDiary, LoseIt!, MyPlate). ▪ Offer Diabetes Self-Management Education and Support (DSMES). ▪ Add agents associated with weight loss such as glucagon-like peptide receptor agonists (GLP-1 RA) or sodium-glucose cotransporter-2 inhibitors (SGLT2i). ▪ Refer to dietitian. ▪ Consider flexible meal dosing for select patients.
Health literacy	▪ Use simple dosing regimen. ▪ Avoid carbohydrate counting or sliding scale by using fixed dosing. ▪ Offer/refer patients to DSMES. ▪ Use newer insulin pen devices versus vials/syringes or new smart pens. ▪ Ensure regular follow-up and continued education. ▪ Use non-insulin therapies such as metformin, GLP-1 RA, SGLT2i, DPP4i (dipeptidyl peptidase 4 inhibitors) to minimize requirements.
Regimen complexity	▪ See strategy for health literacy. ▪ Start with basal insulin; progress to basal plus one injection of mealtime insulin at largest meal. ▪ Use continuous glucose monitoring to minimize need for finger sticks, where possible. ▪ Discontinue duplicate medications; use combination therapies to reduce pill count. ▪ If twice daily basal insulin dosing is needed, use concentrated and/or ultra-long acting insulin analogues (degludec U200, glargine U300) instead.

System Barriers

System-level barriers, such as varying availability of diabetes training and education resources, can inhibit timely insulin initiation and use.

Table 3. System Barriers and Proposed Solutions

Barriers	Proposed Solutions
Lack of easily accessible certified DSMES and support programs	▪ Access DSMES administered by lay leaders (such as Stanford and DEEP) that may be offered through local area agencies on aging or local health departments. ▪ Use mobile apps and web-based programs that offer diabetes management support (e.g., American Diabetes Association Project Power, diabetes.org/project-power).
Lack of provider time	▪ Engage nurse or pharmacist-assisted management. ▪ Utilize technology-based assistance, such as apps that remind patients to check blood glucose, take diabetes medications, offer coaching messages, and sync with other devices to pool data and generate reports that can be shared with provider (e.g., mySugr, One Drop, BD™ Diabetes Care App, Tidepool, Glooko). ▪ Apply patient-focused titration algorithms. ▪ Encourage patient to address appropriateness of insulin initiation with all members of their care team.
Social determinants of health	▪ Screen for and address social needs. Access to consistent meals, general financial barriers, cost of medications and healthcare, health literacy, and housing are examples of social determinants of health that may impact insulin initiation and use (see Additional Resources).

Insulin Initiation Checklist

Checklist for providers and educators initiating insulin with patients to ensure all relevant topics are covered.

1. Determine patient barriers to insulin and address.
2. Introduce patient to insulin.
    a. Explain benefits and risks, why they are starting insulin, and regimen.
3. Order insulin, needles, or syringe/needles.
4. Provide insulin education.
    a. Counsel on injection technique, dose frequency and amount, and storage.
    b. Counsel on hypoglycemia prevention and treatment.
5. Ensure tools for monitoring are in place.
    a. Order testing supplies.
    b. Educate patient on when and how often to test.
    c. Educate patient on blood glucose goals.
6. Follow up every 1 to 2 weeks to review blood glucose readings and titrate regimen.

Conclusion

Challenges to glycemic control in patients with T2D can be caused by barriers to insulin initiation, titration, and treatment intensification at the provider, patient, and health care system level. Using clinical approaches, such as motivational interviewing, shared decision making, and education, for patients with diabetes can alleviate barriers to starting and using insulin. Many new technologies, such as sensors to improve glucose tracking and apps that support patients' day-to-day diabetes management, allow patients to share data more efficiently. Together, these measures may help reduce barriers to insulin use.

Additional Resources

- American Diabetes Power Project
  diabetes.org/project-power
- U.S. Department of Health & Human Services Guidance Portal 340B Drug Pricing Program Registration
  hhs.gov/guidance/document/340b-drug-pricing-program-registration-1

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- Diabetes Quality Improvement Project (QIP) Toolkit
  cardi-oh.org/resources/diabetes-qip-clinical-toolkit
- Minimizing Hypoglycemia Risk to Improve Cardiovascular Health
  cardi-oh.org/resources/minimizing-hypoglycemia-risk-to-improve-cardiovascular-health
- Beyond the A1C: Targets for Blood Glucose and Methods of Measurement
  cardi-oh.org/resources/beyond-the-a1c-targets-for-blood-glucose-and-methods-of-measurement
- Outpatient Diabetes Management for Primary Care Physicians Medications Intensification and Algorithm
  cardi-oh.org/resources/outpatient-diabetes-management-for-primary-care-providers-medications-intensification-and-algorithm
- Addressing Clinical Inertia in Diabetes Care
  cardi-oh.org/resources/addressing-clinical-inertia-in-diabetes-care
- Clinician's Pocket Guide on Motivational Interviewing
  cardi-oh.org/resources/clinicians-pocket-guide-on-motivational-interviewing
- Shared Decision Making and Diabetes Care
  cardi-oh.org/resources/shared-decision-making-and-diabetes-care
- Podcast 21 - Talking With Your Patients: Insulin Initiation and Administration
  cardi-oh.org/resources/podcast-21--talking-with-your-patients-insulin-initiation-and-administration

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