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The Lifesaving Shot: A Deep Dive into Insulin Injection for Diabetic Patients

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Introduction :

Diabetes mellitus is one of the most prevalent chronic diseases worldwide, affecting millions of people. It is a metabolic disorder characterized by high blood sugar levels, which is the inability to produce insulin or properly due to body disability. In various remedies available, insulin injections remain a foundation for the management of diabetes, especially for individuals with type 1 diabetes and with some type 2 diabetes that do not respond to oral drugs. Despite its importance, insulin therapy is often fulfilled with apprehension due to fear of needle, misunderstanding and improper administration techniques. This article investigates the future of insulin therapy in insulin injection, their importance, administration techniques, challenges and diabetes management.

Understanding Diabetes and Insulin Therapy :

Diabetes is classified into several types, of which type 1 and type 2 are the most common.

- Type 1 Diabetes: An autoimmune condition where the body's immune system attacks insulin-produced beta cells in the pancreas, leading to a complete insulin deficiency. Individuals with type 1 diabetes require lifelong insulin therapy.
- Type 2 Diabetes: Specialty of insulin resistance and relative insulin deficiency, type 2 diabetes is often managed with lifestyle modifications and oral drugs. However, some patients eventually require insulin therapy due to progressive beta-cell laxity.
- Gestational diabetes: occurs during pregnancy and insulin therapy may be required if blood sugar levels cannot be controlled through diet and exercise.

Insulin injections are necessary in changing or complementing the insulin of the body to effectively regulate blood sugar levels. Failure to manage diabetes can cause serious complications such as heart disease, renal failure, nerve damage and vision loss.

Types of Insulin

Insulin is categorized based on its onset, peak, and duration of action:

1. **Rapid-acting Insulin:**
    - Examples: Insulin Lispro (Humalog), Insulin Aspart (Novolog)
    - Onset: 10-30 minutes
    - Peak: 30-90 minutes
    - Duration: 3-5 hours
    - Used before meals to control postprandial blood sugar spikes.
2. **Short-acting (Regular) Insulin:**
    - Examples: Humulin R, Novolin R
    - Onset: 30-60 minutes
    - Peak: 2-4 hours
    - Duration: 6-8 hours
    - Used before meals; slightly longer effect than rapid-acting insulin.
3. **Intermediate-acting Insulin:**
    - Examples: NPH (Humulin N, Novolin N)
    - Onset: 1-2 hours
    - Peak: 4-12 hours
    - Duration: 12-18 hours
    - Provides basal insulin coverage, usually taken twice daily.
4. **Long-acting Insulin:**
    - Examples: Insulin Glargine (Lantus, Basaglar), Insulin Detemir (Levemir)
    - Onset: 1-2 hours

- Peak: Minimal to no peak
- Duration: 24 hours or more
- Provides stable basal insulin levels throughout the day and night.

5. **Ultra-long-acting Insulin:**
   - Example: Insulin Degludec (Tresiba)
   - Onset: 30-90 minutes
   - Peak: No significant peak
   - Duration: Up to 42 hours
   - Offers extended control with reduced risk of hypoglycemia.

Insulin Administration Techniques :

Insulin is administered subcontinent (under the skin) using syringes, insulin pens, or insulin pumps. Proper technique is important to ensure efficacy and prevent complications.

1. Choosing the Injection Site

- General sites include abdominal, thigh, upper weapon and buttocks.
- Stomach provides fastest absorption, which is ideal for rapid acting insulin.
- Rotating injection sites prevent lipohypertrophy (frequent injection lumps or thick skin).

2. Steps for Insulin Injection Using a Syringe/Pen

- **Wash hands thoroughly.**
- **Prepare the insulin dose:** Roll cloudy insulin (NPH) between the palms to mix evenly.
- **Clean the injection site with an alcohol swab.**
- **Pinch the skin** (if needed) to avoid injecting into muscle.
- **Insert the needle at a 90-degree angle** (45-degree if using a long needle or injecting into a lean area).
- **Inject insulin slowly and steadily.**
- **Wait a few seconds before withdrawing the needle.**
- **Dispose of the needle safely.**

3. Using Insulin Pumps

- Insulin pumps provide continuous leather insulin infusion (CSII), mimicking the natural insulin release of the body.
- The device is programmed to give basal and bolts doses based on personal needs.
- Regular monitoring and site changes are required every 2-3 days.

Challenges and Solutions in Insulin Therapy :

1. Needle Phobia and Psychological Barriers

- Solution: Counseling, insulin pens with finer needles, and insulin pumps can improve adherence.

2. Injection Site Complications

- Lipohypertrophy and lipoatrophy occur due to repeated injections in the same area.
- Solution: Rotate injection sites and use a proper injection technique.

3. Hypoglycemia (Low Blood Sugar)

- Symptoms: Sweating, dizziness, confusion, palpitations.
- Solution: Follow proper dosing guidelines and keep fast-acting carbohydrates on hand.

4. Hyperglycemia (High Blood Sugar)

- Caused by missed doses, improper dosing, illness, or stress.
- Solution: Regular blood glucose monitoring and timely insulin administration.

5. Cost and Accessibility

- Insulin can be expensive, especially for those without insurance.
- Solution: Governments and organizations are working on affordable insulin programs and generic alternatives.

Future of Insulin Therapy :

Innovations in insulin therapy continue to evolve, making diabetes management easier and more effective.

1. Smart Insulin Pens

- Connected devices track insulin doses and send data to mobile apps, reducing the risk of missed or duplicate doses.

2. Artificial Pancreas Systems

- Closed-loop insulin delivery systems use continuous glucose monitors (CGMs) and insulin pumps to automate insulin dosing.

3. Oral Insulin and Inhalable Insulin

- Research is underway to develop oral and inhalable insulin to eliminate the need for injections.

4. Stem Cell and Gene Therapy

- Efforts are being made to regenerate insulin-producing beta cells to provide a permanent cure for diabetes.

Conclusion :

Insulin therapy remains an important component of diabetes management, providing life -saving benefits to millions of people worldwide. While challenges such as discomfort, cost and access to injection persist, progress in insulin technology provides hope for better treatment options. By understanding insulin types, proper administration techniques and emerging innovations, diabetic patients can achieve better glycemic control, reduce the risk of complications and lead a healthy life. Education and awareness in diabetes management remains important in ensuring optimal rearing and acceptance of insulin therapy in diabetes management.

REFERENCE :

1. .International Diabetes Federation (IDF). IDF diabetes atlas 2021. Brussels: International Diabetes Federation; 2021.
2. .Lepeska M. Insulin users' perspective profile 2017. Amsterdam: Health Action International; 2017.
3. .Bajwa SS, Bajwa S, Baruah M, Kalra S. An acute need for awareness of insulin injection guidelines in operative and intensive care units. Anesth Essays Res. 2013;7:1. doi: 10.4103/0259-1162.113976.
4. .Gibney MA, Fitz-Patrick D, Klonoff DC, Whooley S, Lu B, Yue W, et al. User experiences with second-generation 32-gauge × 4 mm vs thinner comparator pen needles: prospective randomized trial. Curr Med Res Opin. 2020;36:1591–600. doi: 10.1080/03007995.2020.1803248.
5. Grassi G, Scuntero P, Trepiccioni R, Marubbi F, Strauss K. Optimizing insulin injection technique and its effect on blood glucose control. J Clin Transl Endocrinol. 2014;1:145–150. doi: 10.1016/j.jcte.2014.07.006. [
6. .Frid AH, Hirsch LJ, Menchior AR, Morel DR, Strauss KW. Worldwide injection technique questionnaire study: population parameters and injection practices. Mayo Clin Proc. 2016;91:1212–1223. doi: 10.1016/j.mayocp.2016.06.011.
7. .Netere AK, Ashete E, Gebreyohannes EA, Belachew SA. Evaluations of knowledge, skills and practices of insulin storage and injection handling techniques of diabetic patients in Ethiopian primary hospitals. BMC Public Health. 2020;20:1537. doi: 10.1186/s12889-020-09622-4.
8. .Kesavadev J, Saboo B, Krishna MB, Krishnan G. Evolution of insulin delivery devices: from syringes, pens, and pumps to DIY artificial pancreas. Diabetes Ther. 2020;11:1251–1269. doi: 10.1007/s13300-020-00831-z.]
9. .Dickinson FS. Hypodermic syringe. US Patent US1742497, 1930.
10. Whitney EH. Disposable Luer lock syringe. US Patent 4220151, 1980.
11. .Masierek M, Nabrdalik K, Janota O, Kwiendacz H, Macherski M, Gumprecht J. The review of insulin pens—past, present, and look to the future. Front Endocrinol. 2022;13:827484. doi: 10.3389/fendo.2022.827484. [
12. .Tandon N, Kalra S, Balhara YS, Baruah M, Chadha M, Chandalia H, et al. Forum for injection technique and therapy expert recommendations, India: The Indian recommendations for best practice in insulin injection technique, 2017. Indian J Endocr Metab. 2017;21:600. doi: 10.4103/ijem.IJEM_97_17. [
13. .Singh R, Samuel C, Jacob JJ. A comparison of insulin pen devices and disposable plastic syringes—simplicity, safety, convenience and cost differences. Eur Endocrinol. 2018;14:47. doi: 10.17925/EE.2018.14.1.47.