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Review Article

Diabetes Mellitus Type 2. Role of Pharmacist in Subcutaneous Therapy. A Challenge!

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ABSTRACT
Diabetes mellitus type 2 is chronic and progressive condition which results in micro vascular as well as macro vascular complications. Management of this condition comprises of non-pharmacological and pharmacological measures. A pharmacological intervention includes administration of anti-diabetes agents. These agents are either oral or subcutaneous. Depending on the disease condition, physicians prescribe either oral or subcutaneous or both forms. Pharmacist has got a vital role for effective patient counseling in community or hospital settings. Proper and effective subcutaneous administration of anti-diabetes drugs can control the condition effectively. In this educative mini-review article, we will put light on the challenges in subcutaneous therapy of this condition and we will elaborate the expanded role of pharmacist to address these challenges through effective communication.

Key words: Diabetes Mellitus type 2, Subcutaneous injectables for diabetes management, Pharmacist role in effective diabetes management, Pharmacist-Patient Communication.

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INTRODUCTION

Diabetes mellitus is a complex, chronic and progressive condition which is characterized by an increase in blood glucose levels, a phenomenon known as Hyperglycemia. The prevalence of this disease is increasing worldwide.[1]

Diabetes type II (DT2) is characterized by insulin resistance in peripheral tissues and / or insufficient insulin secretion by β-cells of Pancreas. This insufficient production of insulin (insulinaemia) is associated with decreased β-cells mass and/or dys-functioning of existing β-cells.[2] This results in chronic DT2 with carbohydrate, fat and protein metabolism disorder.[2]

Chronic DT2 progresses towards micro vascular as well as macro vascular complications. Nephropathy (Kidney disease), retinopathy (blindness) and neuropathy are bracketed into micro vascular complications. While macro vascular complications include ischemic heart disease, stroke and ischemia of the lower extremities resulting into cardiovascular disease and diabetic foot ulceration. Macro vascular complications of DT2 are major cause of mortality in these populations.[3-5]

Management of DT2

The primary target in the treatment of diabetes mellitus is to normalize blood glucose levels.[6] DT2 patients are initially advised to adopt non pharmacological measures like healthy lifestyle, appropriate exercise, weight loss and healthy food.[7-8] For uncontrolled DT2, Induction of appropriate pharmacological agent/s can result in good control of blood sugar levels.[7-8] Consequently these measures can significantly reduce the risk of development and progression of serious complications of this disease.

Canadian Diabetes Association has set the guidelines to individualize the therapeutic goals for effective control of DT2.[9] According to these guidelines, glycaemic targets like glycosylated hemoglobin (HbA1C), levels post, and pre-prandial glucose levels should be individualized for each patient depending upon age, risk of hypoglycemia, presence of co morbidities (cardiovascular disease, kidney disease), and life expectancy. The set therapeutic goals must be achieved within three to six months of starting non-pharmacological, pharmacological or both measures.[9] If these goals are not achieved within three to six months, the Guidelines then recommend intensifying the therapy.

Timely add-on therapy is important to control the disease condition as it has been evidenced by UKPDS trial that patients, who effectively control their diabetes during first 10 years, had significantly decreased the risk of heart attack by 15%, micro vascular complications by 24% and death by 13 %.[10]

Therapy should be intensified through add on therapy for the patients who are not achieving therapeutic goals despite of having appropriate dose of pharmacological agent along with non-pharmacological measures. Another appropriate pharmacological agent from a different class should be incorporated in therapeutic regime of the patient. While pharmacologic therapy must be instituted for the patients who are practicing only non-pharmacological measures to control the disease.

Achievement of therapeutic goals

Metformin, if not contraindicated, remains the first-line therapeutic option for treatment of type II diabetic patients. This is due to its effectiveness in increasing the sensitivity of cells to insulin thus lowering blood glucose levels. Along with its beneficial effects on blood glucose levels, Metformin also produces beneficial effect on weight loss, lipids, insulinaemia and diastolic blood pressure, thus making it ideal choice for obese patients[11]. No other oral agent has benefits compared to Metformin.[11]

It should also be noted here that Injectable Insulin can also be used as first line agent in DT2 when there is significantly increased glycosylated hemoglobin (HbA1C=9%) in newly diagnosed patients or in patients with symptomatic hyperglycemia with metabolic decompensation.[9]

However, there is a wide range of second-line therapies, including oral agents (alpha-glucosidase inhibitors, sulphonylureas, meglitinides and thiazolidinediones) and agents to inject subcutaneously like Insulin and In cretin agents (GPP-4 Inhibitors, Glucagon like peptide receptor agonists- - GLP-1 i.e Exenatide and liraglutide).[12]

When metformin therapy fails to achieve therapeutic goals, selection of appropriate therapy should depend upon both the patient's characteristics and the properties of agents.[9] Patient characteristics include Blood glucose levels over the last 3 to 6 months or A1C value, sensitivity to

hypoglycemia, weight, co morbidities and other preferences etc. Therapeutic agent should be selected depending on glucose-lowering potency, risk of inducing hypoglycemia as side effect, effect on weight, effect in reducing diabetes complications, no adverse impact on co morbidities, contraindications and side-effects and cost etc.[9]

Second-line anti-diabetes drugs have to be prescribed in appropriate combinations that will allow patients to meet their glycaemic targets as quickly and safely as possible. In this regard if injection therapy is considered then focus should now be on selection of appropriate agent which best suits the patient. Add-on agent should match the patient's needs and ideally will be associated with marked lowering of A1C, will have low or no risk of hypoglycemia, and will be weight-neutral or will promote weight loss.

Injectable in cretin agents represent attractive candidates as second-line or add-on options because they are associated with significant reductions in A1C, low incidence of hypoglycemia, and the potential for weight loss.[7-8,13]

Pharmacist's role

Hurdles

Pharmacists should be aware of the hurdles that may prevent patients from considering the use of injectable drugs. These hurdles are

- Perception of having failed
- Too complex therapy
- Risk of hypoglycemia (with Insulin, rare with Incretins)
- Weight gain (rare with incretins)
- Injections will hurt
- Social embarrassment
- Scheduling complexity
- Additional costs: supplies, testing materials, travel kits, etc.

Such hurdles typically fall into two basic categories:

- Clinical concerns.
- Psychological issues.

Clinical concerns involved are hypoglycemia, weight gain, and other side effects. While psychological issues range from the anticipated pain of using a needle or social embarrassment of injections to fears that the diabetes is getting much worse and more complex to manage.[14-17]

Being a health professional and practicing in community or hospital settings, the pharmacist has to identify the main concerns of patients. Through effective communication pharmacist is at the best place to help these patients and address their concerns. He/she can help the patient to change their thought process and behavior through professional counseling.

Motivational interviewing techniques can help pharmacists to communicate with the patients and to resolve their concerns. Interviewing should be based on following principles for better counseling

Questioning

Determine the patient position and feelings through open ended questions. It will allow the pharmacist to know about patient's expression around the issue needing change. Don't' ask close ended questions which limit the transfer of information and limit development of conversation.

Empathy

Recognize and respect the patient's personal circumstances without any judgment. Listen positives and negatives around the issue. Never create a confrontational scenario. Show empathy regarding his medical condition.

No arguments

Avoid argumentation. Work with the patient to reach his own conclusion by himself. Be ready to induct pertinent information where you feel appropriate. Patients will not readily want to change so don't expect it as easy. Don't say to the patient that he is wrong and information provided by you is right. Allow the patient to judge that where he/she is now and where he/she wants to be. Don't quickly explain the reason to change. Guide the discussion to have the patient identify the need to change behavior to get where she wants to go. Resist the urge to answer the question for the patient.

Self efficacy

Work with the patient to make a plan and help to develop confidence in achieving the target. Don't give the patient a plan based on what you know is the best way to proceed. It may under cuts the patient's ability to achieve a successful goal and future successes.

Summarize

Summarize to recap the discussion and review the plan or next steps to be taken for change. Don't show frustration if the plan seems to be not conclusive enough. Small achievable steps can lead to better overall results in the change of behavior.

While remaining empathetic and non-judgmental, start discussing with the patient based on above principles. Once the barriers have been identified, help the patient work through some of these issues by discussing the potential benefits of the proposed injectable therapy.

Concerns about injections

Patients may have serious concerns regarding injections with old-fashioned vials, syringes and long painful needles system. Administration of injection several times a day can be a major concern by the patient. They may perceive that starting injection treatment means that other therapies have failed and this is the last option to control disease condition. Concerns about side effects can also create barriers.[18-20] Pharmacists must help patients to understand that injections are just a delivery method for safe, effective and appropriate therapies for controlling blood glucose. They may not be aware of new injectable pen devices.

Familiarization with the injection process early in the course of diabetes treatment helps reduce anxiety and fear. Allowing patients to see and handle a pen device and needle, and even try a placebo injection, goes a long way to address fears, reduce delays in the use of injectable therapy, and increase the acceptance of a needle to deliver drug therapy.

Pharmacists involved with injectable counseling must have knowledge of the characteristics of the various pen devices, length of needle tips, and the correct injection procedure (site rotation, location, holding the injection, etc.).

Recent changes in pharmacists' scope of practice mean that pharmacists in different jurisdictions may now demonstrate subcutaneous procedures such as how to inject insulin or GLP-1 agents, how to doHbA1C testing, and how to test blood glucose levels.

New emerging role of pharmacists allows them to adjust doses and dosage form (e.g. insulin pen type, needles) to meet the patient's needs. Pharmacist can also extend the ongoing prescriptions.[21] Part of the pharmacist's role is to facilitate the choice of agent, ease the acceptance of injectable therapies, and help to overcome the barriers to their use.

The Forum for Injection Technique (FIT)[22] is an easy to use online resource that covers the basics of correct injection technique, pen tip or needle lengths, site selection, and how to reduce or avoid the common problems developed at injection sites after injection. The forum is designed for health professionals who are or who want to be involved in injection counseling, FIT provides the basics of getting the right dose delivered in the right way in the appropriate patient in the most painless

and efficient manner.

Injection delivery devices

Delivery devices, especially prefilled pens, simply require the patient to add a needle tip, dial the dose, and administer the injection. Needle tips as fine as 4 mm make needle insertion virtually painless.[29]

Injection pens are intuitive devices that have been optimized for safety and ease of use. Most pens are proprietary devices with unique features, designed to work with the specific insulin or GLP-1 agonist (exenatide or liraglutide) from the same manufacturer.

The choice of delivery device presents an opportunity to improve adherence and to help empower the patient. Pharmacists should find out which features are important to the patient as these can effectively guide the choice of injectable therapy.[23-24]

Following properties of injection pen should be considered for appropriate selection:

Design and Esthetics

- Exterior design and styling.
- Size and portability.
- How well the cap fits onto the pen.
- Tactile feel.
- USABILITY
- Easy to figure out.
- Easy to set dose
- Easy to read that exact dose is set.
- Easy to correct dose if over dialed.
- Are clicks easy to hear?
- Is there unique sound which reflects that dose is complete?
- Is it easy done with one hand or two hands are involved in its use?
- Easy to determine the entire dose delivery.
- Easy to determine the remaining supply of drug.

For instance, a patient with arthritis might prefer a device that requires little effort of only one hand to deliver the dose while another patient with limited vision might appreciate a pen with audible feedback with sounds that differentiate between actions.[25,26]

Prefilled devices promote self-sufficiency, as patients can feel certain they can easily prepare and deliver the proper dose.[27] To an overwhelmed patient who is taking an important step in managing their diabetes, anything that makes it simple and easy, will smooth this transition.

Needles

While communicating with the patient regarding needles, information given must be simple and clear. Discuss with them about different size needles. Advantages and disadvantages of different lengths and diameters needles. Needle lengths available are 4 to 12.7 mm. Selection of appropriate needle depends on the different factors like gender, basic mass index of the patient and site of administration.[28-30] Site of administration gives the distance between skin the muscle fascia. To minimize the risk of intramuscular injection and to assure the subcutaneous administration of injection, an appropriate size must be selected. From 8 to 12.7 mm needles have higher risk if intramuscular insertion, while this risk is significantly reduced with 4 to 6 mm needles.[28-30] Injectable can be administered subcutaneously in a correct manner, if appropriate technique is employed with appropriately selected needle size.[28-30]

Patient must be provided with the information that pen needles are for single use only. After use the needle should be discarded appropriately in child safe container. Usually these safe containers for used needles are provided by pharmacy free of cost. Patients should be informed that 2nd use of needle will be painful due to blunted tips and can also result into complications at injection site.

The recommendations to individualize therapy and therapeutic goals are changing now regarding the management of DT2. The role of the pharmacist is also evolving. It is going to be under the scope of pharmacist to suggest the use of an injectable therapy, when appropriate. Pharmacist has to assist patients in accepting this step. Through proper counseling, Pharmacist is at the best position to ensure the adherence of patient with injectable therapy. Health benefits thus can be achieved, when the right drug in the right dose in the right location in the most painless, simple, and efficient manner is administered properly.

ABBREVIATIONS USED

DT2: Diabetes Type2; **HbA1C:** Glycosylated Hemoglobin; **UKPDS :** UK Prospective Diabetes Study; **GLP-1:** Glucagon-like peptide-1.

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SUMMARY

- A mini review for Pharmacy students. How to communicate effectively with a diabetes patient regarding subcutaneous therapy.