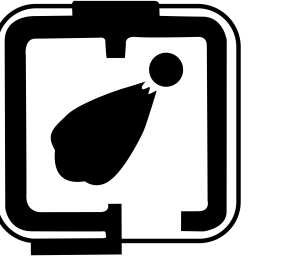


Product for Insulin Self-Administration



DFP-05
Dr. Avinash Chandra Pandey

| | |
|----------|-------------------|
| 22BDS015 | Giridhara Prashad |
| 22BCS049 | Ashwathy Santhosh |
| 22BCS151 | Sathwik Malyala |
| 22BCS234 | Vishnu Bhargav |
| 22BEC126 | Vishnu Urugonda |
| 22BSM044 | Chethan Porika |

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Project Brief

To create an innovative solution to improve the current user experience of products used for self-administering insulin by individuals with diabetes.

Considerations

- User-Centrism
- Patentability

User/Field Study

Research Goals

1. Existing products and their drawbacks.
2. Previous Innovations and ideas
3. Reasons for failure/success of previous innovations.
4. Amount of people affected.
5. Specific User Pain Points.
6. Type of product needed.
7. Area of intervention.
8. User Insights.
9. Are we qualified to solve the problem?

Methodology:

Market study
Literature Review
Qualitative User study



User Interviews

Six participants aged between 50 and 80 years were interviewed.

Four of the participants were long-term insulin users, having used insulin for over a decade. Two participants required insulin temporarily due to surgical procedures.

Observations and User Insights

- Users encounter difficulties in **consistently** administering insulin due to various factors, such as forgetfulness, lack of seriousness, and context.
- Users **skip** insulin doses when they need to attend brief social functions.
- Users demand **privacy** when self-administering insulin and prefer not to face inquiries about it.
- Users typically adhere to the initial product they have used and **resist change**.

User Endgoal

Users desire to self-administer insulin

- **independently,**
- **effortlessly and**
- **discreetly,**
- **without apprehension of judgment, in any location.**

Data Analysis

In India, there are estimated **77 million people** above the age of 18 years are suffering from diabetes (type 2) and nearly 25 million are prediabetics (at a higher risk of developing diabetes in near future)

They consume about 160 million insulin syringes and about 50 million pen needles annually, along with about 40 million syringes used for immunization

Each syringe weighs 3.28 g. Excluding the weight of the cannula, the net amount of plastic generated from insulin syringes alone, each year is 600,000 kg ($3 \text{ g} \times 200 \text{ million syringes}$)

Apart from this, roughly 9.6 crore (96,000,000) vials, cartridges and prefills are consumed in a 12-month period (6.7 crore vials, 2.5 cartridge and 0.7 disposable pens), adding to the burden of glass and plastic on the environment (derived from IMS data).

Sustainability concerns

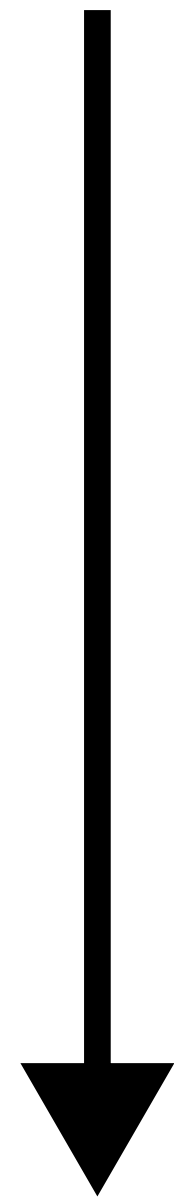
The bulk of plastic used in diabetes care can easily be shifted from bio-medical waste to plastic waste, provided it is disinfected properly. This will include all insulin syringes, plastic cartridges and pens. The plastic used in the manufacture of many disposable pens is biodegradable. However, the time frame for biodegradation is quite long. Hence, disinfection, followed by recycling, is a better option. The same applies for glass waste, such as vials and cartridges, and stainless steel waste, like needles. These can also be disinfected and recycled as per norms of MSW disposal.

Lipohypertrophy

Lipohypertrophy is a condition where fat tissue builds up under the skin due to repeated insulin injections in the same area. It's a common complication of insulin therapy for people with diabetes.

Lipohypertrophy can be prevented by switching between different areas of your body for injections. This practice is known as rotating the injection site.

Technical/Product Specs (evolved)



first insulin injection

vials of insulin became available commercially

large glass syringes were used to administer insulin - needed sterilization and needle sharpening

1970s brought an alternate delivery system—the insulin pump

fifteen yrs later, the first insulin pen was introduced to the marketplace



Insulin Vials and Syringes

The vials hold a lot of insulin

Syringes are single use, disposable, but people use thrice

The whole injection is replaced every use

~0.5 units measurement accuracy

Need to carry around multiple injections and a glass vial

Looks scary, so users tend to want a private space to administer

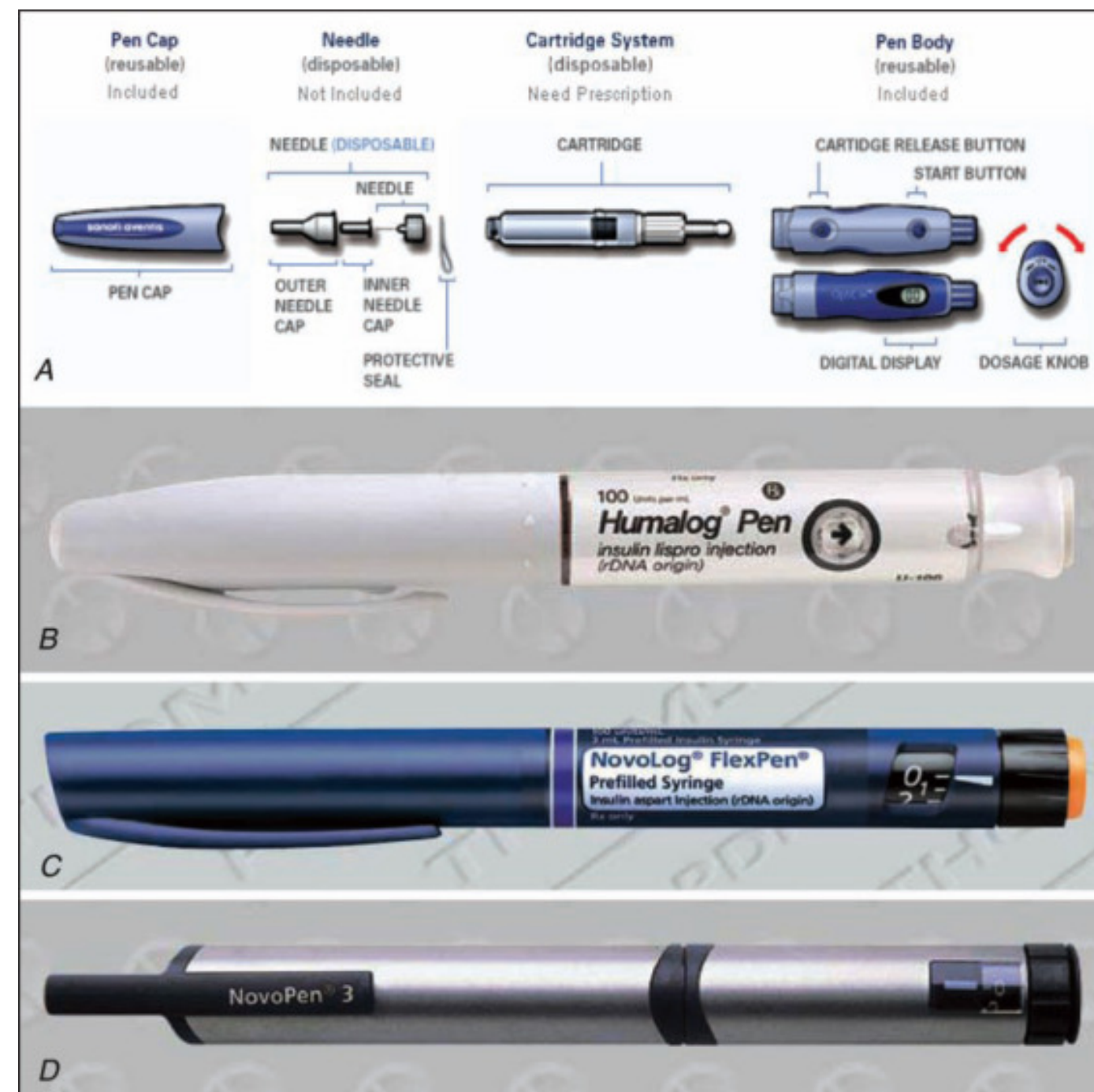
May provoke questions

Insulin Pens

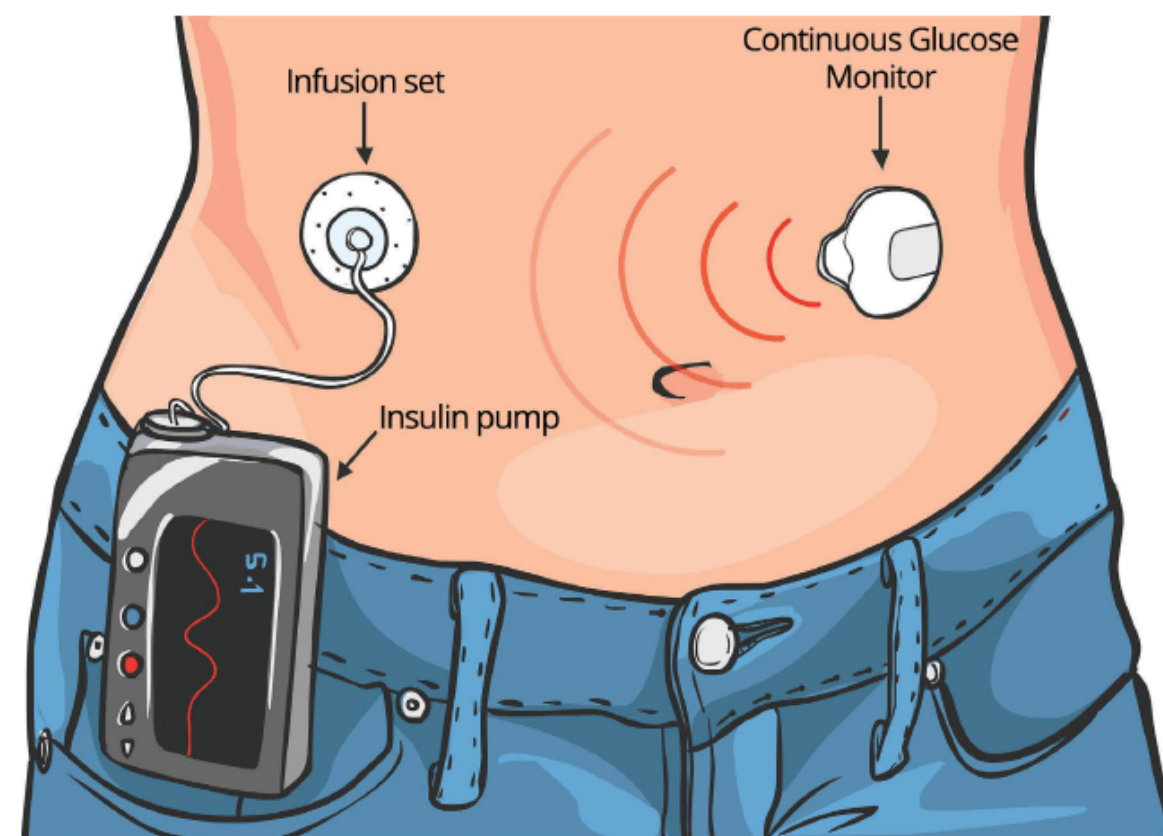
This is an insulin pen, mechanical, you can set amount of insulin you need to inject, and pressing the button after positioning the needle will inject exact amount in the spot

Advantages:

- Easier to use - don't have to hold vial and measure with syringe
 - More portable and discrete
 - more accurate doses
-
- Users tend to forget where they kept their pen, and also miss doses
 - The needle alone has to be replaced each time, and has to be bought in mass
 - The insulin cartridges in re-useable pens need to be bought again and again



Insulin Pumps (CSII)



These are insulin pumps/patches.

removes most difficulties, and is like better in every way.

but people in india don't seem to use it a lot for some reason, unless in extreme conditions.

maybe due to cost. \$4,500 and \$6,500 on average

it is also perceived to be used only by people who have severe conditions, so users who haven't had complications yet don't think they need constant monitoring

Pumps are actually the best solution to self administering insulin because it calculates and delivers needed amount of insulin in real time, reducing risks of overdosing, and complications.

Inhalable insulin (Afrezza)



Reduces number of doses of injected insulin, but doesn't subvert the need

Rigid dosing options

Possibility of side effects including Lung Cancer



Concept 1 - Inhaler

Objective: Develop a user-friendly product for self-administration of inhalable insulin.

Inhalable insulin is still in the Research and Development phase, making the design of an administration product crucial for future opportunities.

Concept -2 - Pen Redesign with alerts and location

Objective: Redesign Insulin Pens to remind users when to take insulin and make them understand the importance of taking insulin, while also remembering the previous site of injection.

Concept -3 - Insulin Pump Redesign

Objective: Redesign Insulin Pumps to decrease stereotypes related to the same, and make it's operation understandable to even the illiterate populace.