

# **CONSUMER BEHAVIOUR ANALYSIS IN VARIOUS NOVEL DRUG DELIVERY SYSTEM**

Dissertation Submitted to



**The IIHMR University, Jaipur**

for the partial fulfilment for the award of the degree of

Master of Business Administration (MBA)

in

Pharmaceutical Management

By

Varnika Tapa

Under the Supervision and Guidance of

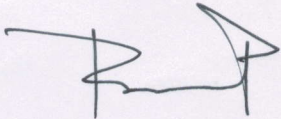
Dr Saurabh Kumar

2024

## Completion Certification

### CERTIFICATE

This is to certify that **Varnika Tapa** in partial fulfillment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur has successfully completed her internship at **Torrent Pharmaceuticals, Ahmedabad** during April 22<sup>nd</sup> to June 30<sup>th</sup>.



**Mr. Pavan Patel**  
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**Date:**

26/6/24

### **DECLARATION BY STUDENT**

This dissertation, entitled "Consumer Behaviour Analysis in various Novel Drug Delivery System (NDDS)", is the authentic documentation of my original research work, I therefore declare. I certify that it has not been submitted for consideration of any degree or certificate to any other university. The text includes appropriate acknowledgments for any information that was taken from other people's published or unpublished works.

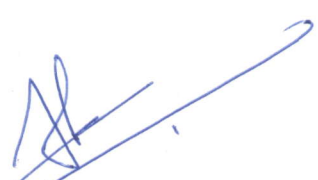
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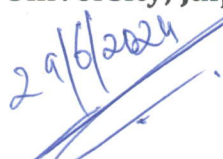
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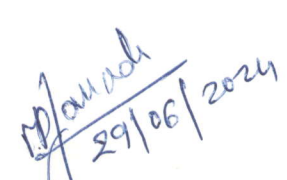
## CERTIFICATE

This is to certify that dissertation titled CONSUMER BEHAVIOUR ANALYSIS IN VARIOUS NOVEL DRUG DELIVERY SYSTEM. is a record of the research work undertaken by Varnika Tapa in partial fulfillment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur under my guidance and supervision and his/her approach to the research study has been sincere, scientific, and analytical

  
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## **ABSTRACT**

Title: CONSUMER BEHAVIOUR ANALYSIS IN VARIOUS NOVEL DRUG DELIVERY SYSTEM.

Author Name: Varnika Tapa

Advisor Name: Dr. Saurabh Banerjee

Keyword: Novel Drug Delivery Systems (NDDS), Consumer behavior analysis, Technological advancements, Psychological factors, Social influences, Economic considerations, Consumer decision-making, Nanoparticles, Liposomes, Transdermal patches, Implantable devices, Therapeutic efficacy, Targeted drug delivery, Reduced side effects, Patient compliance, Perceived effectiveness, Pricing strategies

Background: The field of novel drug delivery systems (NDDS) is experiencing rapid advancements, catalyzing a significant shift in consumer behavior. This dissertation explores the multifaceted dimensions of consumer behavior in the context of NDDS, encompassing the psychological, social, and economic factors that influence consumer decision-making processes. The research is structured to provide a comprehensive analysis of how innovative drug delivery technologies, such as nanoparticles, liposomes, transdermal patches, and implantable devices, are reshaping consumer perceptions and preferences in the pharmaceutical landscape.

Objective:

1. To recognise and process lower dose changes, stability problems, and delayed medication action as difficulties associated with the Novel medication Delivery System.
2. Identifying and classifying the various Novel Drug Delivery Systems (NDDS) that are on the market.
3. To ascertain whether consumers are aware of NDDS, comprehend them, and believe they are superior to conventional medication delivery techniques.
4. To examine how cost, cost-effectiveness, convenience, and safety are affecting customer choices and adoption of NDDS.
5. To evaluate the impact of medical professionals on consumer decisions and NDDS uptake.
6. To assess how consumer behaviour about NDDS is affected by marketing tactics and information sharing.
7. To investigate how users feel about different NDDS in terms of usability, efficacy, and side effects.
7. To investigate how users feel about different NDDS in terms of usability, efficacy, and side effects.

### Methodology:

1. To evaluate the difficulties associated with the Novel Drug Delivery System, including decreased dose modifications, stability problems, and delayed drug action.
2. To recognise and classify the many Novel Drug Delivery Systems (NDDS) that are on the market.
3. to research the aspects of cost, cost-effectiveness, convenience, and safety that affect customer choices and adoption of NDDS.
4. To assess how healthcare practitioners affect consumer decisions and NDDS uptake.
5. To give healthcare professionals with recommendations on tactics to increase NDDS uptake and customer acceptability.

### Results/Findings:

The dissertation concludes by emphasising how crucial it is to create and sell NDDS with a consumer-centric mindset. The aforementioned study provides significant insights for pharmaceutical firms, healthcare practitioners, and regulators that seek to encourage the use of novel drug delivery technology by shedding light on the variety of factors that impact consumer behaviour. By highlighting the necessity of strategies that match technical improvements with customer expectations and requirements, the research adds to the larger conversation on healthcare innovation.

51 healthcare professionals have participated in this survey, from which 89% were M.D. Medicine, and rest are Cardiologists, Endo, ENT. Any survey with at least one completed question was deemed an effort. Every survey attempt was taken into account during analysis. The physicians were exclusively from Ahmedabad.

### **ACKNOWLEDGEMENT:**

I would like to sincerely thank and appreciate the following people and organization for their guidance in finishing this thesis:

My mentor Mr. Pavan Patel, AGM CVD Divison, Torrent Pharmaceuticals, Ahmedabad, for their guidance, patience, and expertise throughout this research. Their invaluable advice and constructive feedback have been instrumental in shaping the direction and quality of this work.

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Secondly, I would like to express my gratitude to Dr. Prahlad Rai Sodani, President of IHMR University, Jaipur for encouraging me to take this dissertation. Also, I am extremely thankful to my faculty guide Dr. Saurabh Kumar Banerjee, (Dean and Associate professor, School of Pharmaceutical Management) for his valuable guidance, keen interest and encouragement throughout the completion of this project.

This dissertation has not only enriched me professionally but also on a personal level. Additionally, I would like to thank the organization that have supported this research, I'm extremely thankful to Torrent Pharmaceuticals, Ahmedabad to give me honor in this study which has played a significant role in its successful completion.

Also, I would like to thank my friends & family who encouraged me throughout this time and helped me on every obstacle and for being my stressbusters, motivators and proof-readers.

Lastly, I would want to express my sincere gratitude to everyone who has helped with this work in any way, whether through discussions, reviews, or encouragement. Your contributions have been truly valuable and have shaped this thesis for the better.

Varnika Tapa

Date: 28/June/20

Place- Jaipur

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### **Torrent Pharmaceuticals**

A well-known pharmaceutical firm in the nation is Torrent Pharma, the parent company of Torrent Group. Women's healthcare (WHC), cardiovascular (CV), central nervous system (CNS), gastrointestinal (GI), vitamins, minerals, and nutrition (VMN), and cosmo-dermatology are among the therapeutic areas in which the company is acknowledged as a leader. The idea of niche marketing was one of the first to be introduced in India by it. The company is also heavily represented in the areas of pain treatment, diabetes, gynaecology, cancer, and anti-infectives.

Torrent Pharma's competitive edge comes from its state-of-the-art production facilities, state-of-the-art R&D capabilities, extensive domestic network, and global presence in over 50 countries.

Torrent Pharma's dominance in the Indian Pharma industry was reinforced by the acquisitions of Elder Pharma's Indian branded business in 2013, Zyg Pharma's dermatological division in 2015, Glochem Industries' API plant in 2016, Novartis' women's healthcare brands, Unichem's Indian branded business and its Sikkim plant in 2017, and Curatio in 2022. Large surface area and highly vascularized mucosa characterise the nasal cavity. The first pass metabolism is avoided when drugs absorbed via the dense blood vessel network enter the systemic circulation immediately. Analysing the many factors included in this study demonstrates stringent pharmacovigilance with regard to this type of dosage form since nasal spray quality control is a crucial area where high standards must be maintained.

Assay for Preservatives and Stabilising Excipients; Pump Delivery; Spray Content Uniformity; Spray Content Uniformity (SCU) through Container Life; Spray Pattern and Plume Geometry; Droplet Size Distribution; Particle Size Distribution (suspension); Microscopic Evaluation (Suspensions); Foreign Particulates; Microbial Limit; Preservative Effectiveness; Net Content and Weight Loss (Stability); Leachables (Stability); PH; Osmolality." Official books from all throughout the world have acknowledged these parameters' approval standards.

## **NOVEL DRUG DELIVERY SYSTEM**

Novel Drug Delivery Systems (NDDS) are an important development in the quickly changing pharmaceutical industry that aims to improve therapeutic efficacy, safety, and patient adherence. A variety of cutting-edge technologies, including drug-eluting stents, liposomes, transdermal patches, and nanoparticles, are included in NDDS. These technologies are intended to administer medications to specific body areas more accurately and efficiently. To successfully adapt and integrate these cutting-edge medication delivery methods into clinical practice, it is imperative to comprehend consumer behaviour in this setting.

To conclude, the examination of consumer behaviour within the framework of Novel Drug Delivery Systems is a complex process that involves a multitude of elements, ranging from specific patient traits to more general social and regulatory impacts. Researchers and industry stakeholders will be better equipped to handle the possibilities and difficulties that come with NDDS deployment if they take a comprehensive approach to comprehending these dynamics. This will eventually improve patient outcomes and grow the pharmaceutical sector. Through a thorough examination of the state of consumer behaviour analysis in NDDS and the provision of ideas for future research and practice, this dissertation seeks to investigate these dimensions in depth..<sup>1</sup>

## **LITERATURE REVIEW**

Study title: Review on Nasal Drug Delivery System and Their Application.

Authors: Kanchan Tariyal

### **INTRODUCTION**

Nasal drug delivery has its origins in the topical administration of medications meant for localised effects in the past. The Indian medical system known as Ayurveda recognises nasal therapy, also known as "Nasya karma," as a legitimate kind of treatment. The nasal route was first introduced as a potentially effective systemic medication delivery option in the early 1980s, replacing other traditional routes. The nasal route is a dependable, simple, and easily accessible method of absorbing substances into the systemic circulation. It bypasses the hepatic first pass elimination process because to its highly vascularized epithelium and porous endothelium membrane. Furthermore, intranasal drug delivery facilitates dose reduction, expedites the achievement of therapeutic blood levels, accelerates the commencement of pharmacological activity, and minimises side effects. It may be possible to circumvent the oral route's restriction and replicate the advantages of intravenous delivery thanks to the nose's low metabolic environment. Moreover, nasal delivery reduces the latency period linked to oral drug delivery and provides non-invasiveness, self-administration, patient comfort, and patient compliance—factors that pose challenges for intravenous drug therapy. According to reports, lipophilic medications are typically well absorbed through the nasal cavity with pharmacokinetic profiles that are frequently identical to those obtained following an intravenous injection with a bioavailability that approaches 100%. In contrast, hydrophilic medication absorption can be enhanced through the use of absorption enhancers.

Drugs are administered through the nasal cavity that range in size from tiny compounds to big macromolecules, such as hormones, vaccinations, and peptide/protein therapies. When it comes to avoiding the blood-brain barrier (BBB) and facilitating direct drug delivery during the biophase of central nervous system (CNS) active substances, nasal delivery appears to be a viable option. The administration of vaccinations has also been contemplated. The nasal route has proven to be an effective means of administering several peptides, including

desmopressin, calcitonin, insulin, luteinizing hormone releasing hormone, growth hormone, and adreno-corticotrophic hormone. Other than these, steroids (e.g., testosterone, progesterone, oestrogen, and so on).<sup>5</sup>

### NASAL DRUG DELIVERY USAGE

The nose is a potentially useful drug delivery organ due to its easy accessibility and available surface area. The development of pharmaceutical products is a crucial undertaking that is closely linked to their intended therapeutic uses. The factors that need to be taken into account when developing a product vary depending on whether it is meant for local or systemic delivery. b) One-time or recurrent administration. local shipping Given that nasal delivery has a lower risk of systemic side effects than oral delivery, it makes sense to use it for local (or topical) treatment. As a result, relatively small doses can be administered via the nasal route with less risk of toxic side effects in the body. Among the most common therapeutic drug groups administered are decongestants for symptoms of cold and cough.<sup>6</sup>

For allergic rhinitis, antihistamines and corticosteroids are used. Delivery systemic Compared to oral and intravascular routes of administration, intranasal administration of medications is an excellent technique for the systemic availability of drugs. Compared to oral and parenteral delivery, it offered quicker and longer drug absorption. Analgesics (Ex-morphine), cardiovascular medications such as propranolol and carvedilol, hormones including levonorgestrel, progesterone, and insulin, anti-inflammatory medications such as indomethacin and ketorolac, and antiviral medications (acyclovir) are among the therapeutic types of pharmaceuticals administered.<sup>6</sup>

For the treatment of migraines and cluster headaches, some examples that are on the market are zolmitriptan and sumatriptan. vaccinations for the nose Since the nasal mucosa is the first place the body comes into touch with inhaled antigens during inhalation, its use in vaccination, particularly for respiratory illnesses, has been extensively evaluated.

Actually, because nasal vaccination can raise systemic levels of particular immunoglobulin G and nasal secretory immunoglobulin A, it is a promising substitute for the traditional

parenteral approach. Intranasal vaccinations against influenza A and B viruses, proteosome - influenza, adenovirus-vectored influenza, native Group B meningococcal infection, attenuated respiratory syncytial virus, and parainfluenza are a few instances of vaccines that have been shown to be effective in humans. Many elements influencing the absorption of drugs through the nose The following variables impact the bioavailability of medications taken by nasal route: Structural characteristics, biochemical alterations, and biological factors II Physiological elements: Nasal secretions; blood supply and neural control.<sup>7</sup>

The nose is a potentially useful drug delivery organ due to its easy accessibility and available surface area. Actually, because nasal vaccination can raise systemic levels of particular immunoglobulin G and nasal secretory immunoglobulin A, it is a promising substitute for the traditional parenteral approach. Intranasal vaccinations against influenza A and B viruses, proteosoma-influenza, adenovirus-vectored influenza, native Group B meningococcal infection, attenuated respiratory syncytial virus, and parainfluenza are a few instances of vaccines that have been shown to be effective in humans. Many elements influencing the absorption of drugs through the nose The following variables impact the bioavailability of medications taken by nasal route: I Structural characteristics, biochemical alterations, and biological factors II Physiological elements: Nasal secretions; blood supply and neural control; II.<sup>8</sup>

The nose's readily available surface area and ease of accessibility make it a potentially effective organ for medication administration. Depending on whether a product is intended for local or systemic administration, different considerations must be made throughout development. b) Administration done once or often. regional shipping Using nasal administration for local (or topical) therapy makes sense since it has a reduced risk of systemic adverse effects than oral delivery. Consequently, the likelihood of hazardous side effects in the body is reduced when relatively small amounts are taken via the nasal route. One of the most often given therapeutic types of drugs is a decongestant for cold nose symptoms, and another is an antihistamine and corticosteroid for allergic rhinitis.

systemic delivery The intranasal delivery of medicine is a very effective method for achieving systemic availability when compared to oral and intravascular modes of administration. Medication absorption was faster and more prolonged than when given intravenously and orally. Acyclovir is one of the therapeutic types of pharmaceuticals that

are administered. Other pharmaceuticals include hormones like levonorgestrel, progesterone, and insulin; analgesics like exmorphine; anti-inflammatory drugs like indomethacin and ketorolac; and cardiovascular drugs like propranolol and carvedilol. Some examples of medications that are available for the treatment of migraines and cluster headaches include sumatriptan and zolmitriptan. vaccinations directed towards the nose.

The nasal mucosa has been extensively researched for its potential use in vaccination, especially for respiratory diseases, because it is the first site of inhalation where inhaled antigens come into contact. Nosal vaccination is actually a viable alternative to the conventional parenteral technique since it can increase systemic levels of specific immunoglobulin G and nasal secretory immunoglobulin A. immunisations against influenza A and B viruses, parainfluenza, influenza adenovirus-vectored influenza, influenza proteosoma, native Group B meningococcal influenza, and attenuated respiratory syncytial virus are examples of human effectiveness immunisations that are provided via intranasal injection. The nose has a major role in medication absorption due to many factors. The following factors affect how bioavailable drugs are when taken orally:

The biological aspects-

- Modifications in metabolism
- Anatomical features II: Physiological components

The following reasons can cause nasal discharges: pathological conditions; nasal clearance and frequency of ciliary beats; neural regulation and blood supply; the environment.

- The membranes' permeability III. Physicochemical Properties of Drugs. The dosage, molecular weight, size, lipophilicity, solubility, partition coefficient, pka, and chemical form of the drug are all taken into account.
- The polymorphism.<sup>9</sup>

### 3. Problem Statement

#### **Preamble**

This chapter on problem statement deals with the title, aim, objectives scope of the investigation and the methodology used for each objective basically showcasing an outline of the thesis which focuses on the objectives and the extent of analysis, study & tools being used to get the desired result.

#### **Title**

Assessment of “Consumer Behaviour Analysis In Various Novel Drug Delivery System, encompassing the psychological, social, and economic factors that influence consumer decision-making processes.

#### **Aim**

To asses “Consumer Behaviour Analysis In Various Novel Drug Delivery System, encompassing the psychological, social, and economic factors that influence consumer decision-making processes.<sup>10</sup>

## **OBJECTIVES**

1. To identify the challenges include in Novel Drug Delivery System and to process reduced dosage adjustments, stability issues and delayed drug action.
2. To identify and categorize different types of Novel Drug Delivery Systems (NDDS) available in the market.
3. To investigate consumer awareness and understanding of NDDS and their perceived benefits over traditional drug delivery methods.
4. To analyse the factors influencing consumer preferences and acceptance of NDDS, including convenience, efficacy, safety, and cost.
5. To assess the role of healthcare professionals in influencing consumer choices and adoption of NDDS.

### Methods and Methodology

| S.no | Statement of the Objective                                                                                                                         | Method/ Methodology                                                                                       | Resources Required                                      |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 1.   | To asses the challenges include in Novel Drug Delivery System and to process reduced dosage adjustments, stability issues and delayed drug action. | Literature review,<br>Journals                                                                            | EBSCO, Google scholar                                   |
| 2.   | To identify and categorize different types of Novel Drug Delivery Systems (NDDS) available in the market.                                          | Primary data collection –<br>Google forms                                                                 | Data collected from organization-employees and doctors. |
| 3.   | To study the factors influencing consumer preferences and acceptance of NDDS, including convenience, efficacy, safety, and cost.                   | Primary data collection –<br>Google forms                                                                 | Excel Software                                          |
| 4.   | To evaluate the role of healthcare professionals in influencing consumer choices and adoption of NDDS.                                             | Primary data collection –<br>Google forms                                                                 | Excel Software                                          |
| 5.   | To recommend strategies for the healthcare providers on how to improve consumer acceptance and uptake of NDDS.                                     | <ul style="list-style-type: none"><li>● Based on the doctor reviews</li><li>● Literature review</li></ul> | Google scholar, EBSCO, Research gate, Excel Software    |

## **Data Collection**

### **Developing a suitable standard template for collecting primary data from the organisation with respect to supplier selection**

The questionnaire was formulated with the help of Google form the variables of the questionnaire are on the doctor's preference of dosage formulations, cost, patient safety, efficacy, adherence as well the information regarding the department of work and specialisation.

Response had been taken from planning doctor's preference & patient compliance.

### **Studying the factors influencing consumer preferences and acceptance of NDDS, including convenience, efficacy, safety, and cost.**

Sample population – Doctors

Sample size- 51 doctors

Sample method- Google forms

Duration- 15 days, the data was be collected in 10 days

Data collection for the concerned objective was done from the doctors, as to practicality know how on the conventional dosage, its efficacy, safety & cost of the NDDS for patients use.

Elements to Consider: mode of administration (transdermal, injectable, oral, etc.)

Techniques of gathering data: Doctor surveys

### **Evaluating the role of healthcare professionals in influencing consumer choices and adoption of NDDS.**

Sample population – Doctors

Sample size- 51 doctors

Sample method- Google forms

Duration- 15 days, the data was be collected in 10 days

Data collection for the concerned objective was done from the doctors, Their recommendations, based on the clinical experience and their medical knowledge contributing the impact of patient dose preferences along with their preferred choice Elements to Consider: mode of administration (transdermal, injectable, oral, etc.)

Techniques of gathering data: Doctor surveys.

**To asses the challenges include in Novel Drug Delivery System and to process reduced dosage adjustments, stability issues and delayed drug action.**

Innovative Medication Administration Method. The term "novel drug delivery system" (NDDS) describes methods, compositions, apparatus, and systems for delivering a medicinal substance throughout the body as required to safely provide the intended therapeutic effects. It is crucial to assess various words used under several broad categories of innovative drug delivery systems rigorously. Drug action is delivered at a predetermined pace by sustained or controlled drug delivery systems, which offer a steady (zero-order) release of the drug at therapeutically effective levels in the bloodstream. Through spatial or temporal control of drug release (often rate-limiting) in the region of the target, localised drug delivery systems administer medication activity.

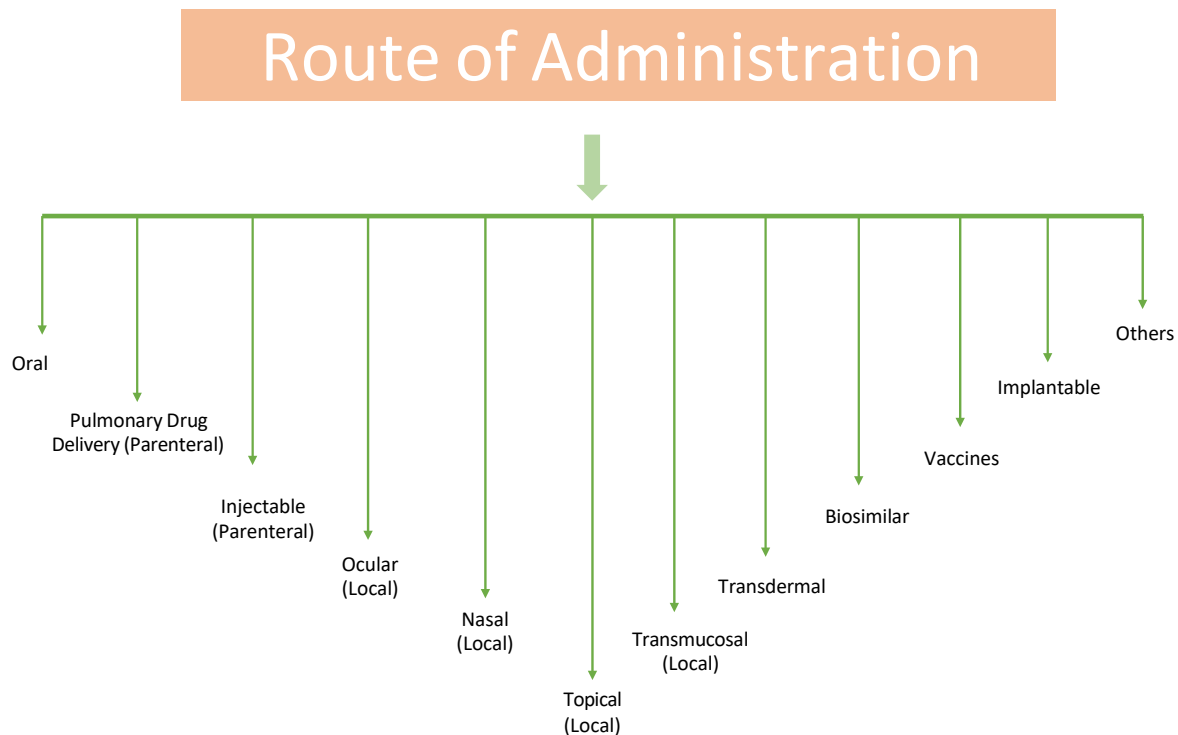
Rate-preprogrammed drug delivery systems work by controlling the molecular diffusion of the drug molecules, hence regulating the release of the drug molecules.<sup>15</sup>

## Types of NDDS-



Fig. 1.1 Types of Novel Drug Delivery System

## Route of Administration-



**Fig. 1.2 Route Of Administration**

### Challenges in Novel Drug Delivery System-

Major Challenges in Drug Delivery Systems are delivery of poorly soluble drugs and bioavailability hurdles for poorly soluble clinical candidates. There are several Novel approaches in the delivery, Overcoming bioavailability hurdles and Rationale formulation design of poorly soluble drugs. Other Major Challenges in Drug Delivery are protein drug delivery, paediatric and geriatric drug delivery. Self-emulsifying drug delivery systems (SEDDS) possess unparalleled potential in improving oral bioavailability of poorly water-soluble drugs. Taking dosage form into consideration makes the event Pharmaceutica 2016 a dosage form meeting.<sup>15</sup>

**To recommend strategies for streamlining the pharmaceutical companies and healthcare providers on how to improve consumer acceptance and uptake of NDDS.**

### How to solve challenges in Novel Drug Delivery System-

1. By improving rate of drug delivery
2. Decreasing Biodegradation
3. Time Release medications
4. Site- specific targeting
5. Finding ways to administer injectable only medications in oral form.
6. By using CRDDS (Control Released Drug Delivery System), TRDDS(Targeted Release Drug Delivery System), SRDDS(Sustained Released Drug Released System).



**Fig. 1.3**

### Disadvantages-

1. Controlled release dosage forms are often more expensive than conventional dosage forms because of use of polymers and special manufacturing technique.
2. There is reduced potential for dose adjustments.
3. In case of failure of dosage form, the risk of dose dumping is present.

| Q2                      |           |         |               |                    |
|-------------------------|-----------|---------|---------------|--------------------|
| Formulations            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Injectable              | 18        | 17%     | 17%           |                    |
| Nasal Spray             | 10        | 10%     | 10%           | 27%                |
| Pulmonary drug delivery | 6         | 6%      | 6%            | 33%                |
| Topical                 | 14        | 14%     | 14%           | 47%                |
| Transdermal             | 2         | 2%      | 2%            | 49%                |
| Injectable              | 3         | 3%      | 3%            | 52%                |
| Oral                    | 49        | 48%     | 48%           | 100%               |
| <b>Total</b>            | 103       | 100%    | 100%          |                    |

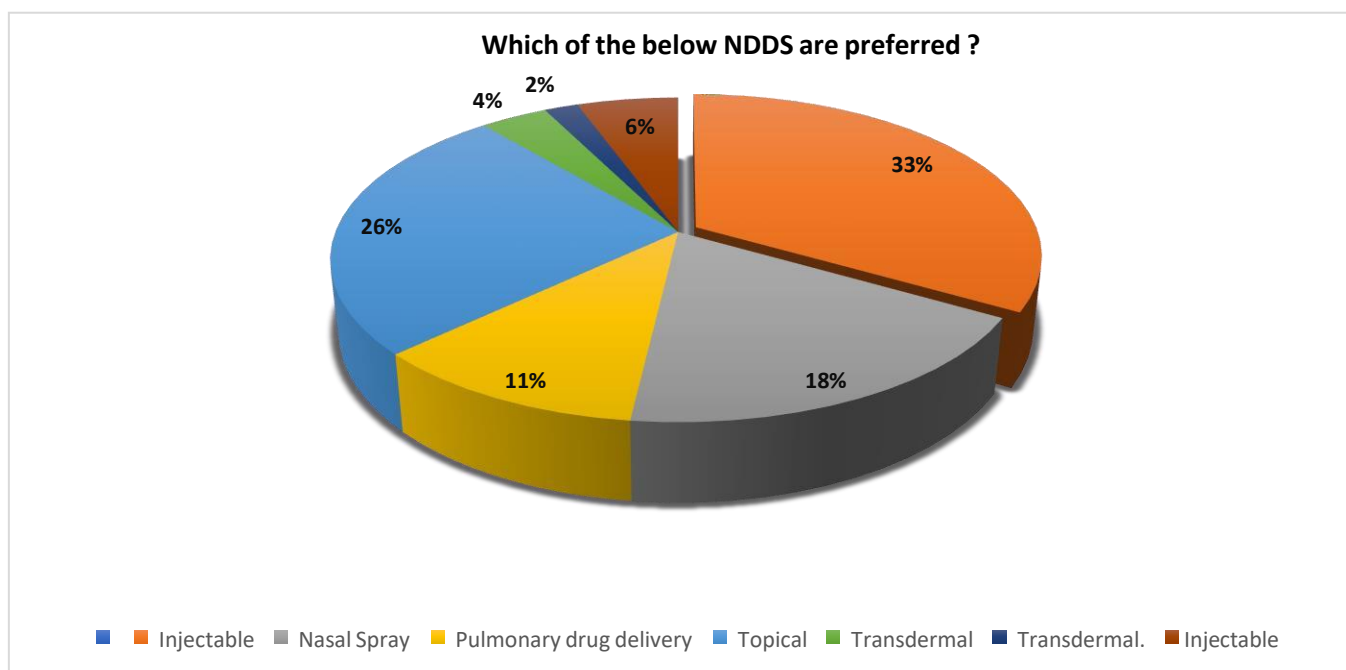


Fig. 2.1

NDDS which are mostly preferred by doctors are oral which is 47% followed by Injectable which is 20% than Topical which is 14%.

**To study the factors influencing consumer preferences and acceptance of NDDS, including convenience, efficacy, safety, and cost.**

| Factors       | Frequency | Percent | Valid Percent | Cumulative Percent |
|---------------|-----------|---------|---------------|--------------------|
| Cost          | 19        | 37%     | 37%           |                    |
| Compliance    | 16        | 31%     | 31%           | 68%                |
| Accessibility | 10        | 19%     | 19%           | 87%                |
| Adherence     | 7         | 13%     | 13%           | 100%               |
| Total         | 51        | 100%    | 100%          |                    |

The factors that influence your prescribing specific formulations are cost which is 37% followed by compliance 31% than accessibility 19% and adherence is only 13%.

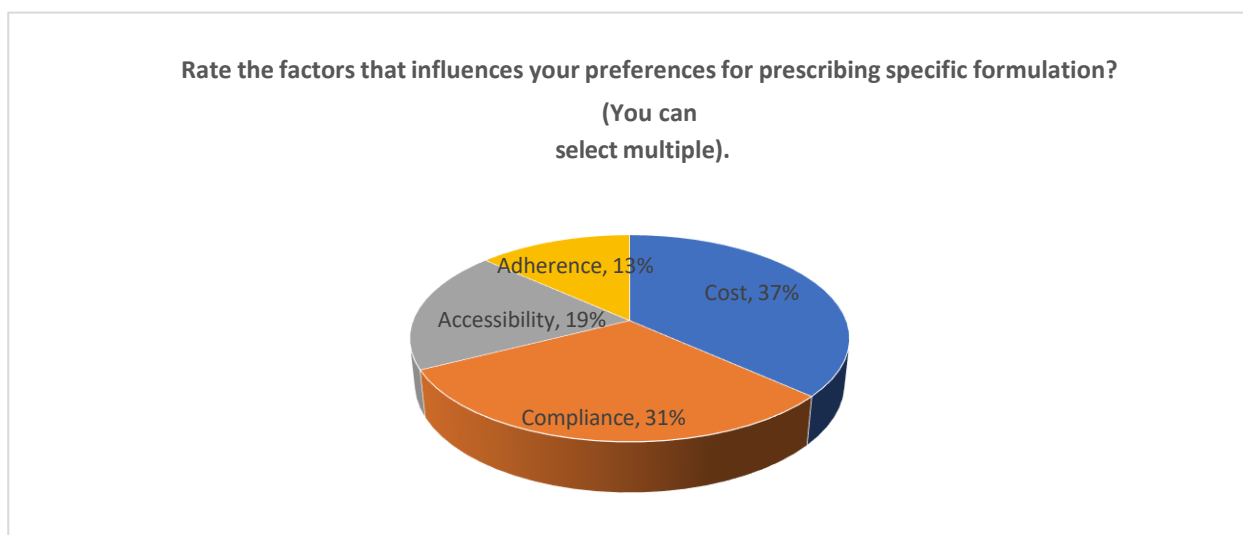


Fig. 2.2

| Factors                      | Frequency | Percent | Valid Percent | Cumulative Percent |
|------------------------------|-----------|---------|---------------|--------------------|
| Cost                         | 9         | 18%     | 18%           |                    |
| Efficacy                     | 5         | 9%      | 9%            | 26%                |
| Safety                       | 15        | 30%     | 30%           | 57%                |
| Side effects                 | 11        | 21%     | 21%           | 78%                |
| Patient convenience on usage | 11        | 22%     | 22%           | 100%               |
| Total                        | 51        |         |               |                    |

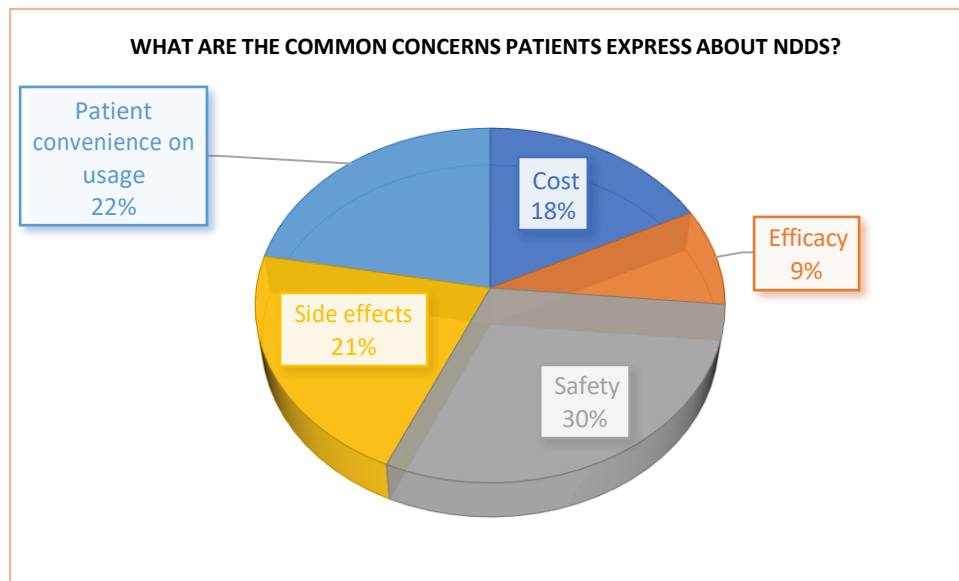


Fig. 2.3

Common concerns which patient express about NDDS are- Safety which is 30%, Patient convenience on usage is 22%, side effects is 21%, cost is 18% and efficacy is 9%.

**To evaluate the role of healthcare professionals in influencing consumer choices and adoption of NDDS.**

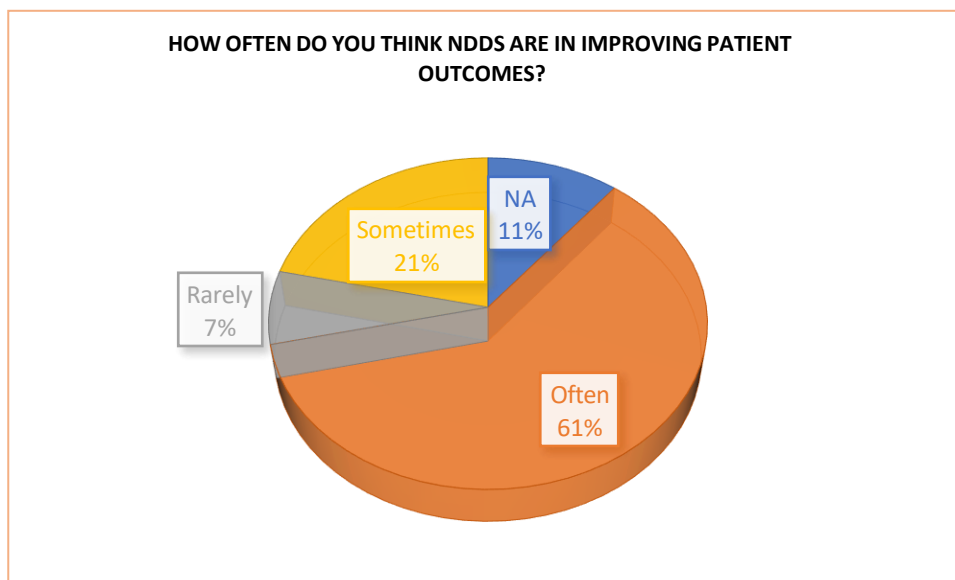


Fig. 2.4

| Factors   | Frequency | Percent | Valid Percent | Cumulative Percent |
|-----------|-----------|---------|---------------|--------------------|
| Often     | 33        | 64%     | 64%           |                    |
| Usually   | 4         | 7%      | 7%            | 71%                |
| Sometimes | 11        | 21%     | 21%           | 93%                |
| Rarely    | 4         | 7%      | 7%            | 100%               |
| Total     | 51        | 100%    | 100%          |                    |

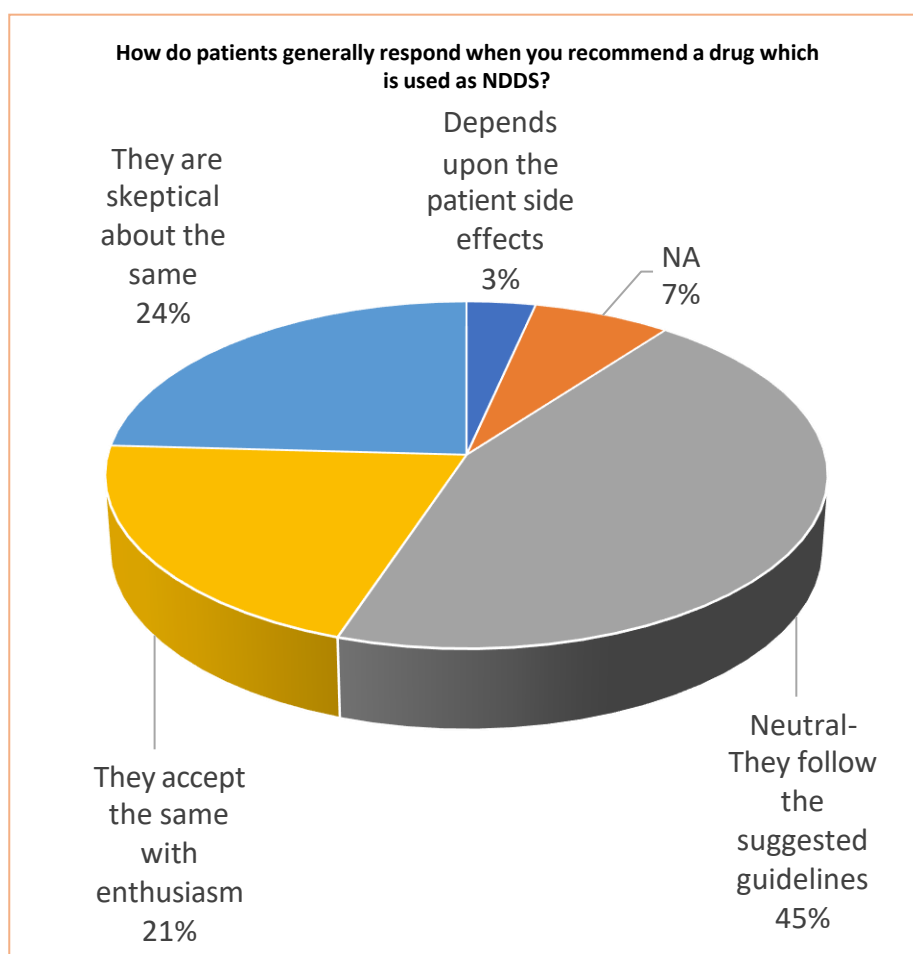


Fig. 2.5

| Factors                                       | Frequency | Percent | Valid Percent | Cumulative Percent |
|-----------------------------------------------|-----------|---------|---------------|--------------------|
| Depends upon patients ide effects             | 2         | 3%      | 3%            |                    |
| Neutral- They follow the suggested guidelines | 23        | 45%     | 45%           | 48%                |
| They accept the same with enthusiasm          | 11        | 21%     | 21%           | 69%                |
| They are skeptical about the same             | 16        | 31%     | 31%           | 100%               |
| Total                                         | 51        | 100%    | 100%          |                    |

Patients generally respond when they are recommended NDDS drug, 45% of patients are Neutral- They follow the suggested guidelines, 24% are Skeptical about the same, 21% accept the same with enthusiasm , 3% depends upon the patients side effects and 7% are NA.

**To recommend strategies for streamlining the pharmaceutical companies and healthcare providers on how to improve consumer acceptance and uptake of NDDS.**

### **Education and Awareness**

Patient Education Initiatives: Create and carry out initiatives to educate patients about the advantages and security of NDDS. Use many channels, including websites, webinars, pamphlets, and live seminars. Training for Healthcare Professionals: Through ongoing professional development and training events, make sure that all healthcare providers are knowledgeable with NDDS. They may now confidently go over these alternatives with patients because to this.

#### **Effective Communication**

Clear and lucid Data: Give patients clear, succinct, and honest information on NDDS, including its advantages, possible drawbacks, and comparisons with conventional delivery methods.

Provide patients with individualised consultations so that medical professionals can answer any questions or concerns they may have regarding NDDS.

#### **Accessibility and Convenience**

Make NDDS easily accessible by making sure they are reasonably priced and easily accessible. Work with insurance providers to get these cutting-edge therapies covered, and look into patient support initiatives.

Reduce Complexity of Use: Provide NDDS that patients may easily use with little effort on their part. Devices that require less frequent administration, for instance, and packaging that is easy to use.

## Feedback and Patient Involvement

**Encourage Patients to Make Decisions:** Engage patients in the process of choosing their course of therapy. Their acceptance of the selected NDDS and sense of ownership may grow as a result.

**Gather Input and Take Action:** Utilise NDDS to routinely gather patient input and utilise the information to inform future developments. Resolving patient issues as soon as possible might increase uptake and satisfaction.<sup>16</sup>

| Factors                                  | Frequen<br>cy | Perce<br>nt | Valid<br>Percent | Cumulative<br>Percent |
|------------------------------------------|---------------|-------------|------------------|-----------------------|
| CMEs                                     | 9             | 18%         | 18%              |                       |
| Conferences and workshops                | 31            | 60%         | 60%              | 78%                   |
| Peer- reviewed journals and publications | 9             | 18%         | 18%              | 97%                   |
| Pharmaceutical representatives           | 2             | 3%          | 3%               | 100%                  |
| Total                                    | 51            | 100%        | 100%             |                       |

According to the survey done by me, they want a platform to know about NDDS in much better way so by continuous medical education (CMEs) so they will get to know about it and have better knowledge about it.

## **RESULTS**

51 healthcare professionals have participated in this survey, from which 89% were M.D. Medicine, and rest are Cardiologists, Endo, ENT. Any survey with at least one completed question was deemed an effort. Every survey attempt was taken into account during analysis. The physicians were exclusively from Ahmedabad.

### Survey Result:-

1. The factors that influence your prescribing specific formulations are cost which is 37% followed by compliance 31% than Accessibility 19% and Adherence is only 13%.
2. Always there is frequent patient compliance which is 47%, than frequently it is 45% and occasionally it is 8%.
3. According to doctors, Oral formulation which is 6% have better patient adherence followed by topical which is 16% injectable 10% nasal sprays and pulmonary drug delivery it is 5% and lastly transdermal it is 3%.
4. In aspect to adherence and compliance of usage patient mostly prefer oral which is 64% as it is easy to take followed by injectable which is 9% because some of the patients are afraid to take injections than nasal sprays 6% and transdermal is 3%.
5. Ibuprofen- NSAID reduce fever, headache, toothache, backpain, arthritis, menstrual cramps.  
Zolpidem- Used in adults to treat insomnia.
6. NDDS are improving patient outcomes which is 61% Oftenly, Sometimes it is 21% Rarely it is 7% and rest is NA which is 11%.
7. 45% of patients are Neutral- They followed the suggested guidelines, 24% are skeptical about the same, 21% accept the same with enthusiasm, 3% depends upon the patient side effects and 7% are NA.
8. Common concerns which patient express about NDDS are safety which is 30% patient convenience on usage which is 22%, Side effects is 21%, Cost is 18% and efficacy is 9%.
9. NDDS which are mostly preferred by doctors are oral which is 47%, Injectable which is 20% followed by topical which is 14%, Nasal spray is 10% and Pulmonary drug delivery is 6%.

## **Conclusion**

The Novel Drug Delivery Systems (NDDS) survey provides important new information about patient attitudes, acceptance, and possible adoption roadblocks. The main results and suggestions are outlined in the following manner:

1. Increased Awareness and Interest:

Based on the possible advantages such increased convenience, decreased side effects, and higher efficacy, the poll shows that patients are becoming more aware of and interested in NDDS.

2. Education and Information Needs:

Patients are generally not well informed on NDDS, even when they are interested in them. This emphasises the necessity of all-encompassing educational programmes by healthcare practitioners.

**Research gaps-**

Efficacy and Safety- Currently NDDS have more efficacy in comparison to older techniques.

Unfavourable outcomes and safety characteristics.

Patient Compliance and Acceptance- Usability and patient compliance with NDDS prescriptions.

patient opinions and contentment.

Cost and Accessibility- The NDDS's affordability for patients.

Problems with distribution and availability.

Innovation and Research Needs- areas that require additional study and improvement. suggestions for novel strategies or enhancements.

Educational and Training Needs- suitability of NDDS education given to physicians.

Resources and more training are required.

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## RESEARCH QUESTION

Q1. Rate the factors that influences your preferences for prescribing specific formulation?  
(You can select multiple).

- Compliance
- Adherence
- Cost
- Accessibility

Q2. How frequent patient compliance is taken into account for deciding formulation?  
(Select One)

- Always
- Frequent
- Occasionally
- Rarely

Q3. Which formulation, in your experience tends to have better patient adherence?

- Oral
- Injectable
- Nasal spray
- Topical
- Pulmonary drug delivery
- Transdermal
- Other (please mention): \_\_\_\_\_

Q4. Regarding adherence & compliance of usage, patient prefer which of the formulations?

- Oral
- Injectable
- Nasal spray
- Topical
- Pulmonary drug delivery
- Transdermal
- Other (please mention): \_\_\_\_\_

Q5. In order to help your patients how do you stay up-to-date with the latest developments in NDDS?

- Conferences and workshops
- CMEs
- Peer- reviewed journals and publications.
- Pharmaceutical representatives
- Other (please mention): \_\_\_\_\_

Q6. How often do you think NDDS are in improving patient outcomes? (Rate from 1 to 5)

- Often
- Some times
- Rarely

Q7. How do patients generally respond when you recommend a drug which is used as NDDS?

- Neutral – They follow the suggested guidelines
- They accept the same with enthusiasm
- They are skeptical about the same, they have doubt/query regarding the same

Q8. What are the common concerns patients express about NDDS?

- Patient convenience on usage
- Cost
- Efficacy
- Safety
- Side effects
- Others (please specify): \_\_\_\_\_

Q9. Which of the below NDDS are preferred by you as a consultant?

- Oral
- Injectable
- Nasal spray
- Topical
- Pulmonary drug delivery
- Transdermal
- Other (please mention): \_\_\_\_\_

