

PRESENTATION

DIGITAL HEALTH REQUIREMENTS FOR PHARMA INDUSTRY

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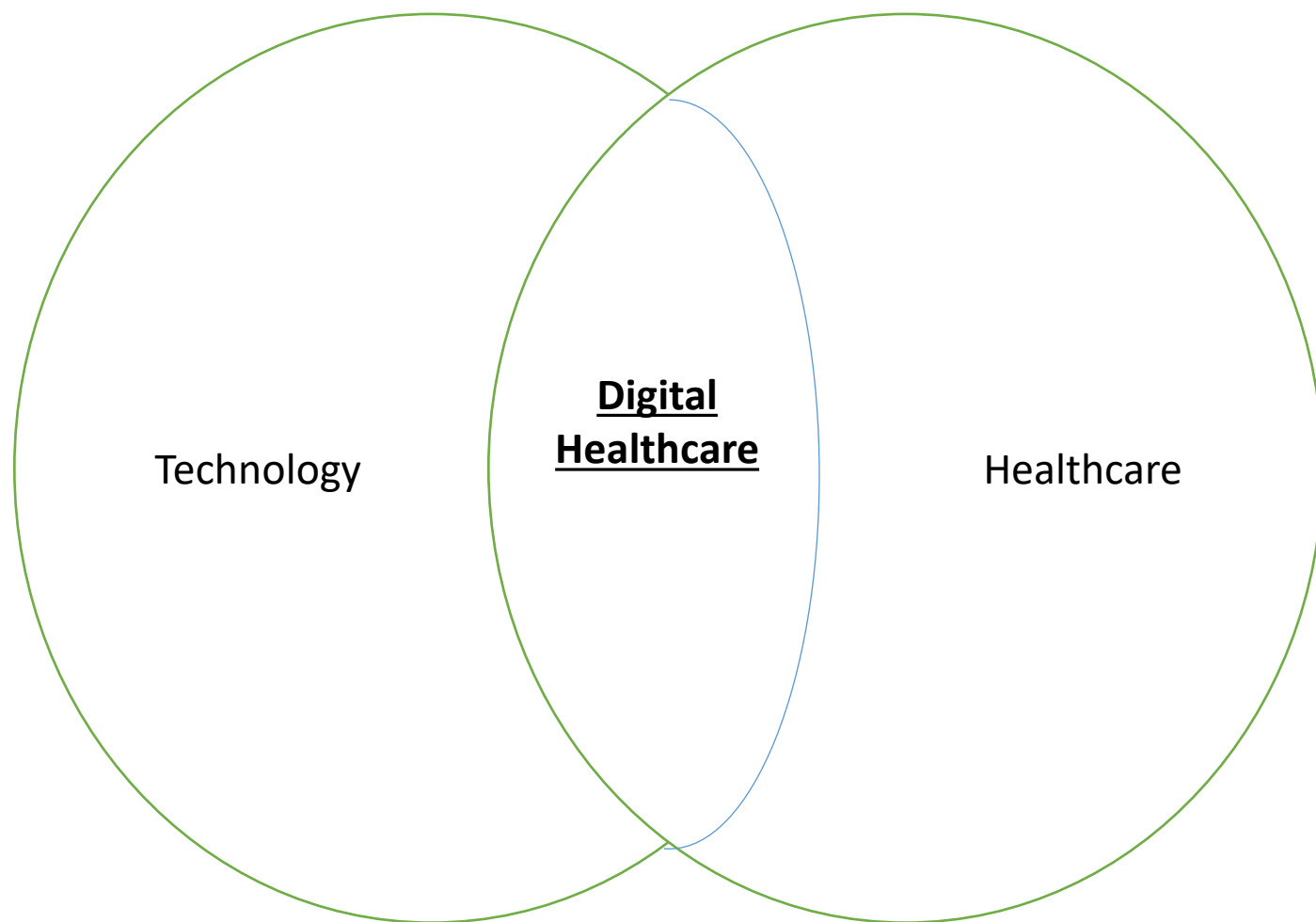


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Introduction

- Over the past few decades, the global pharmaceutical industry has advanced and strengthened its digital infrastructure. Pharmaceutical companies are putting a lot of effort into keeping up with the quick changes brought on by digital technologies. The same technological advancements that have upended the media, retail, and banking industries are starting to do the same for the healthcare sector. These include mobile communications, the cloud, advanced analytics, AI, ML, big data, and the Internet of Things. Pharma executives are experimenting with a number of digital projects because they are aware of their disruptive potential. However, because they are unaware of what digital success will entail in five years, many people are finding it difficult to decide which initiatives to scale up and how to do so.
- A wide, multidisciplinary notion called "digital health" or "digital healthcare" comprises ideas from the point where technology and healthcare converge. Software, technology, and services are all part of digital health, which applies digital transformation to the healthcare industry.



Aim & Objective

AIM

To study, analyze, and evaluate the impact of digital health in the pharma industry, and to identify new digital health requirements for pharma industry.

Objectives

To identify the digital requirements for pharma industry.

Methodology Research Design: -

Study design	Analytical study, Descriptive study (e-pharmacy)
Data collection method	From various platforms of Tata Elxsi
Data analysis plan	Summary Table, charts, and pie-charts
Data used	Secondary data
Software used	Microsoft Excel, Research libraries of Tata Elxsi.
Study duration	3 months (25 March-23 June 2022)
Limitation	Limited access to the data

Emergence of Digital Technology into the pharma traditional value chain

Drug Discovery	AI , Big data ,
Clinical Trials	Virtual clinical trials , precision medicine
Regulatory	Real world evidence , Digital therapeutics
Commercialization	Decision making support , digital marketing
Monitoring	Real time patient monitoring , digital supply chain.

Results & Discussion

E-Pharmacy:

- In remote places, an E-pharmacy is a benefit because it is efficient and responsible. It delivers simple and economical drugs to people houses with just one click, as well as providing information about the medicinal remedies' knowledge to the buyer.--, Netmeds Marketplace Ltd (Reliance Retail), Practo Technologies Private Limited, Lybrate, Inc., Docprime Technologies Private Limited, Care On Go, mChemist Global Pvt. Ltd, Medsonway Solutions Pvt Ltd, are some examples. (pharmatech, n.d.)

METHODOLOGY (E-pharmacy)

- **Study design-** Descriptive study (E-pharmacy)
- **Data collection method:** The data was primary which had collected by using standard questionnaires circulated among the consumers via google forms.
- **Sample size:** 150 consumers.
- **Analysis:** Analysis was done by using Microsoft Excel.
- **Data collection tool:** Questionnaire.
- **Study area:** PAN INDIA.

Result

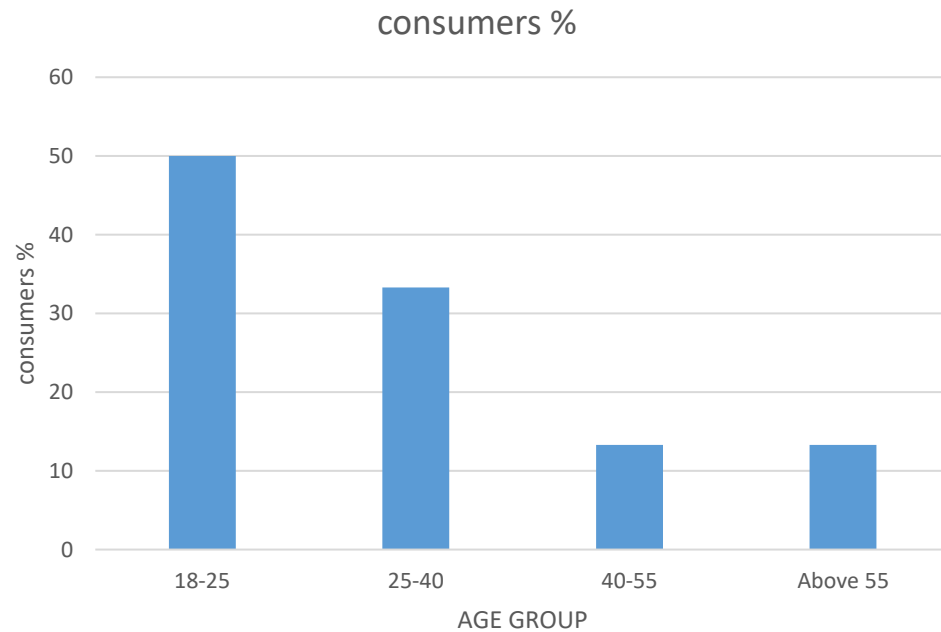


Fig. 1. – Age group

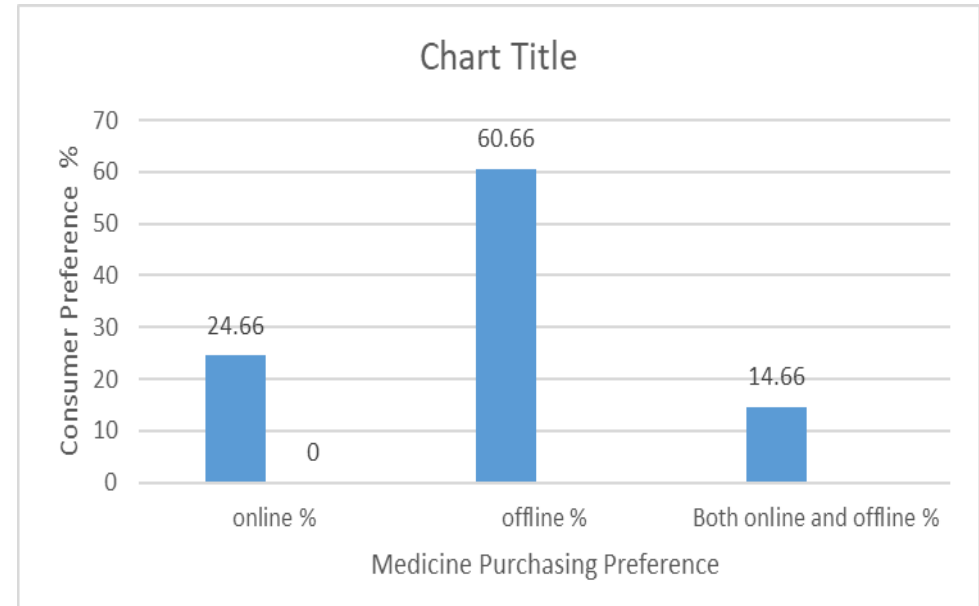


Fig. 2. Medicine purchasing preference

Collected data shows that most of the consumers purchase medicines from offline pharmacy stores, while few of them are from both online and offline pharmacies. Consumers purchasing only from an online pharmacy are 24.66% which is less as compared to an offline pharmacy.

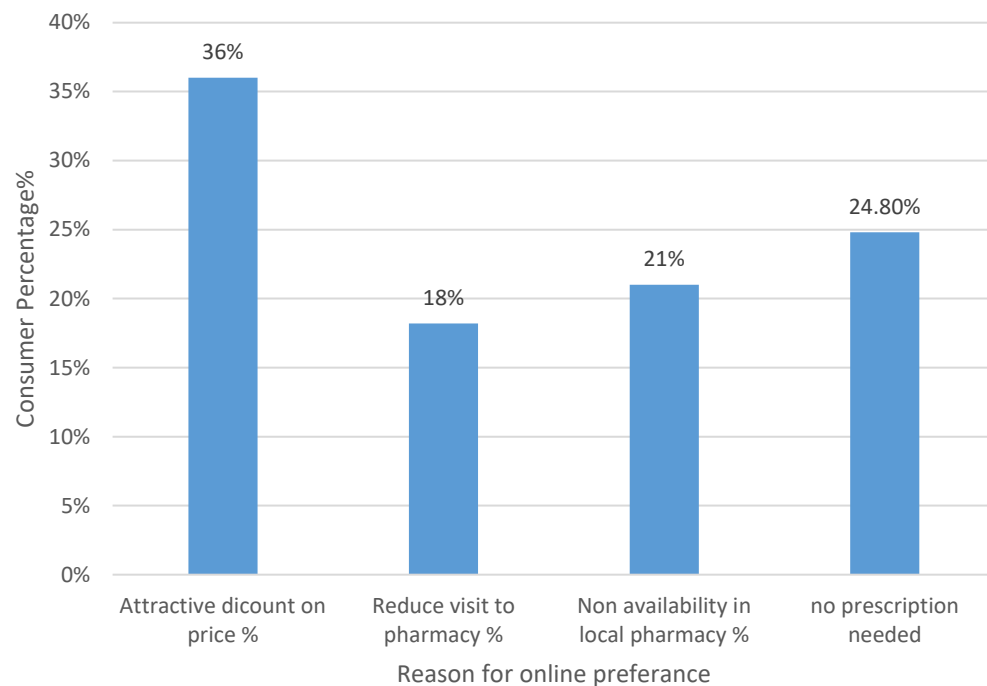


Fig. 3. Reason for online preference

A major reason for purchasing medicines from the online platform is an attractive discount on the price, followed by non-availability in local pharmacies and reduced visits to a pharmacy store.

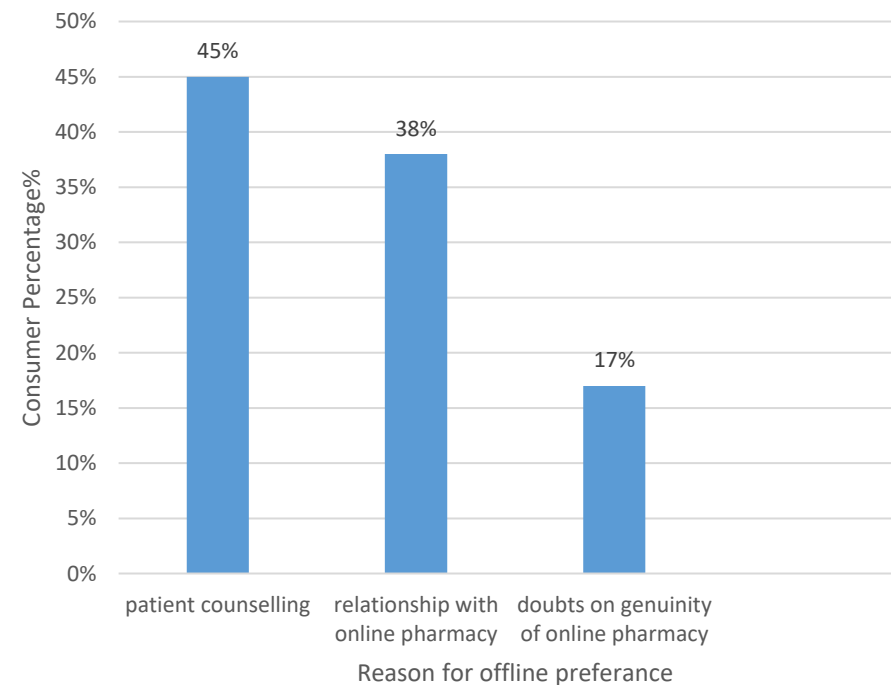


Fig. 4. Reason for offline preference

The reason behind consumers preferring offline pharmacies over online is patient counseling at offline pharmacy stores. Also, relationship with offline pharmacy and doubt about the Genuinity of online pharmacy also seems to be major reasons.

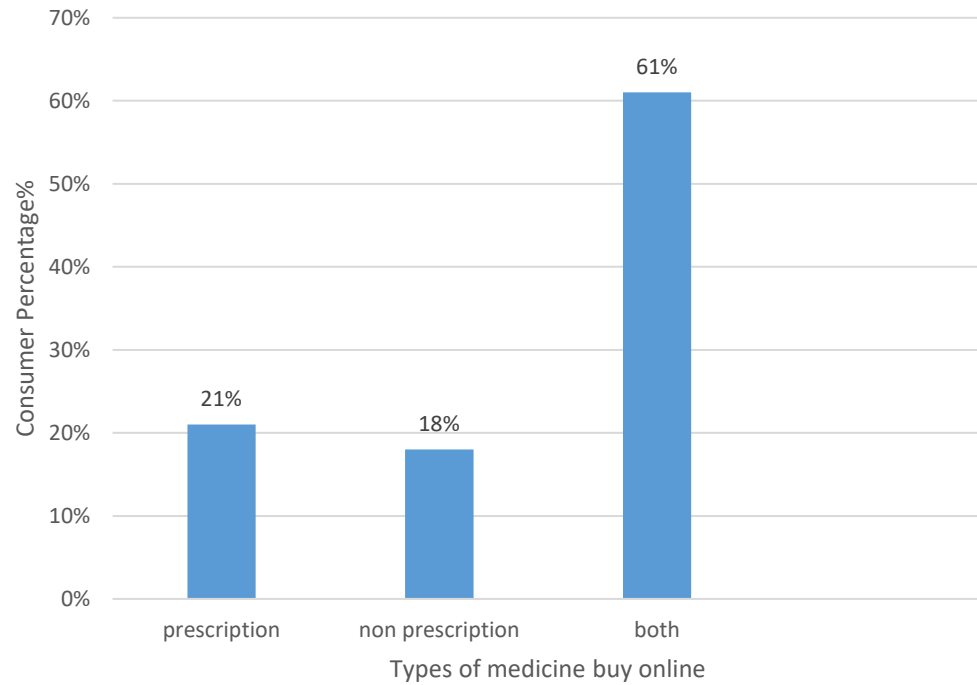


Fig. 5. *Types of medicines buy online*

Both prescription and non-prescription drugs are purchased from online stores.

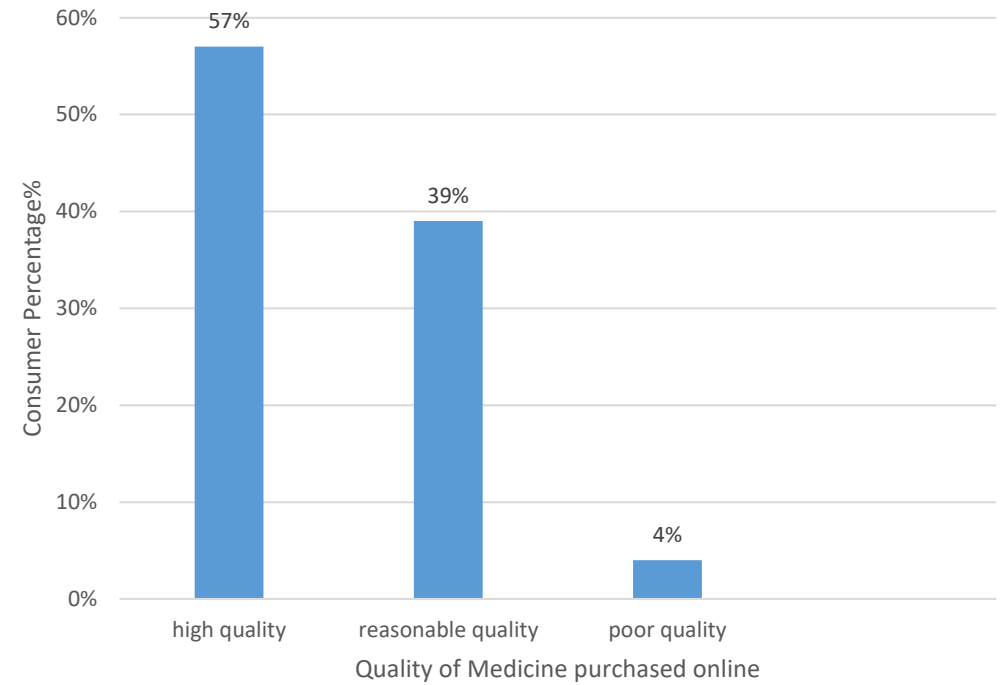


Fig. 6. *Quality of medicines purchased online*

Consumer experience about the quality of medicines from online pharmacy stores is found to be reasonable to high.

Would you order medicines online in the future?

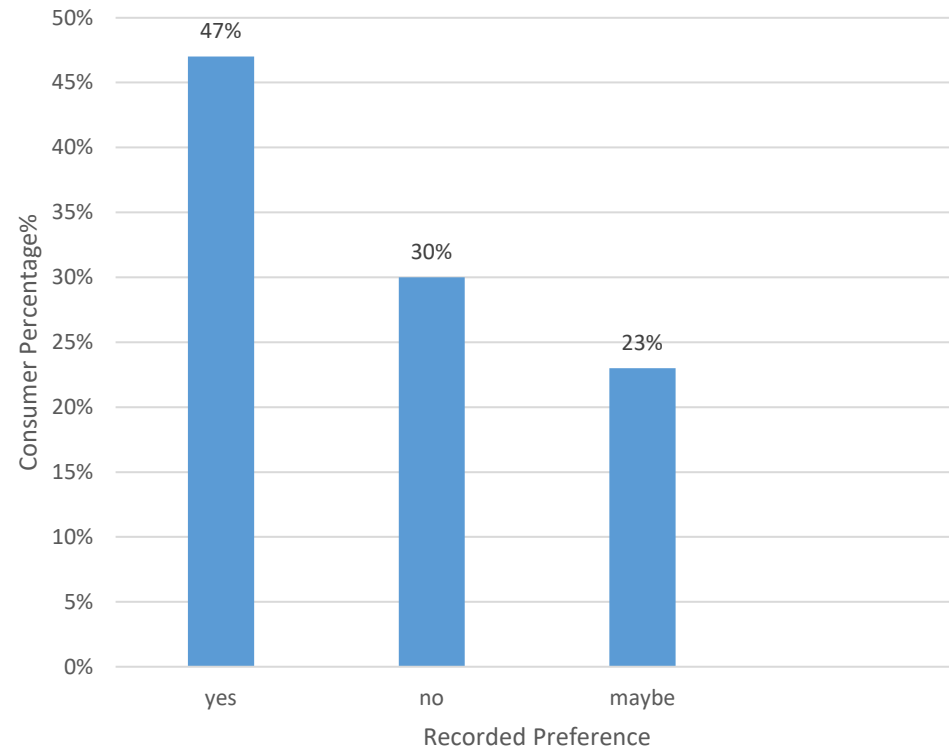


Fig. 7. Reorder preference

Most consumer's perception about buying medicines from an online store is positive for the future.

Would you like to recommend online pharmacy to your friends and family?

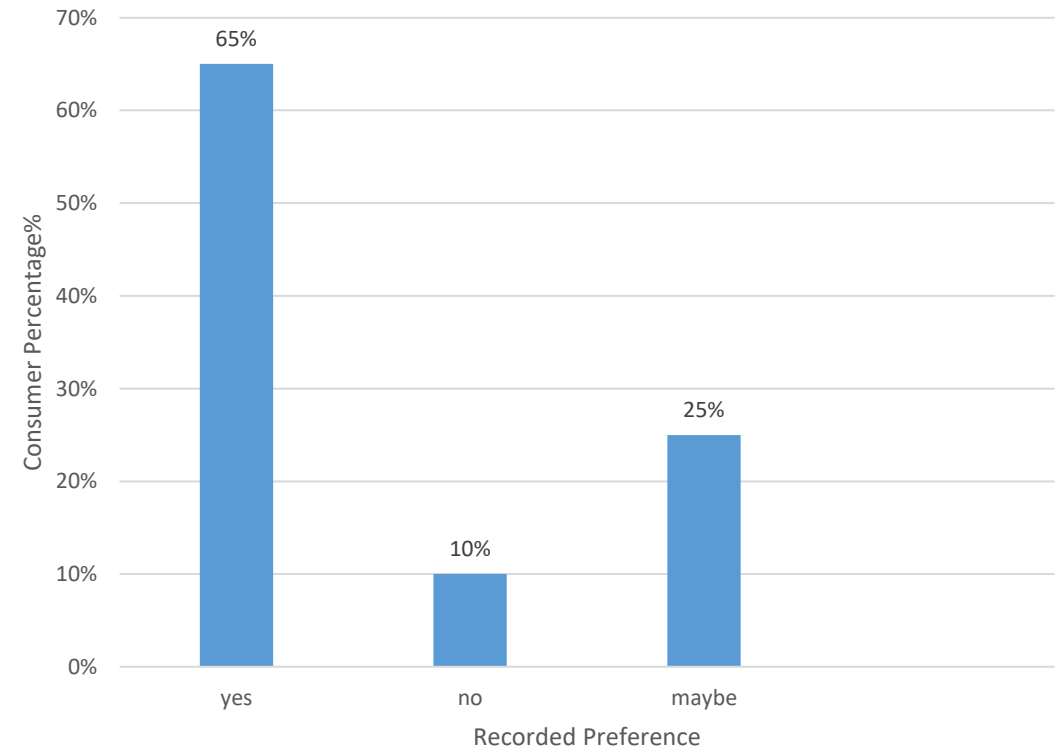
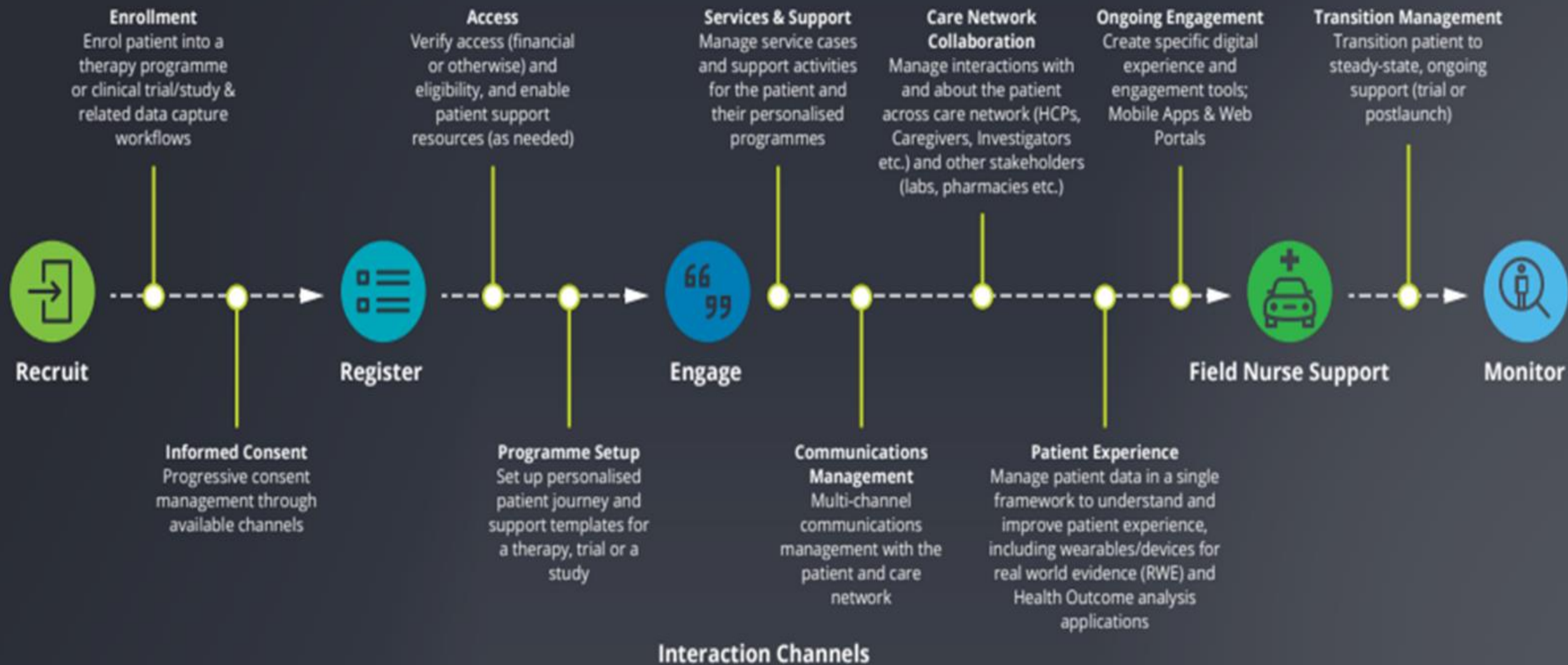


Fig. 8. Recommendation for online pharmacy

According to the data, the consumers are willing to recommend online pharmacies to their friends and family for future purchases of medicines

Patient Assistance programs: -

- Through employment health insurance, Medicaid, or Medicare, a large number of Americans are partially protected from the exorbitant expense of prescription medications. However, even individuals with insurance may be burdened by coverage gaps and formulary limitations. Additionally, those without proper prescription drug coverage or health insurance must pay for their own prescriptions.
- Patient assistance programmes (PAPs), which are typically funded by drug companies, are marketed as a "safety net" for those in the United States who lack health insurance or have inadequate coverage. These initiatives' objective is to give patients financial support so they can obtain medications for little or no cost.



Stakeholders' Journey



01

Request through voice & non-voice process made for the sponsor's medication

02

Identification of eligible patients (self-pay /underinsured patients)

03

Physician completes the patient enrolment form

04

Submits the form & insurance documents to PAP sponsor, documents reviewed by the PAP vendor



08

Patient information & activities data securely transferred to the sponsor for insight generation

07

Tracking, monitoring and refilling of products
Reimbursement of bills

06

Patient receives support from PAP:

- Access to drug
- Training
- Advice & awareness
- Infusions
- Safety reporting

05

PAP vendor coordinates the PAP for the sponsor

Impact of Patient Assistance Program on Community

Assisting patients with high out-of-pocket costs of medicines

Digital transformation to provide enhanced stakeholder experience

The "patient-as-consumer" culture enables patients to expect outcomes to be personalized, delivered on their terms, and of high value.



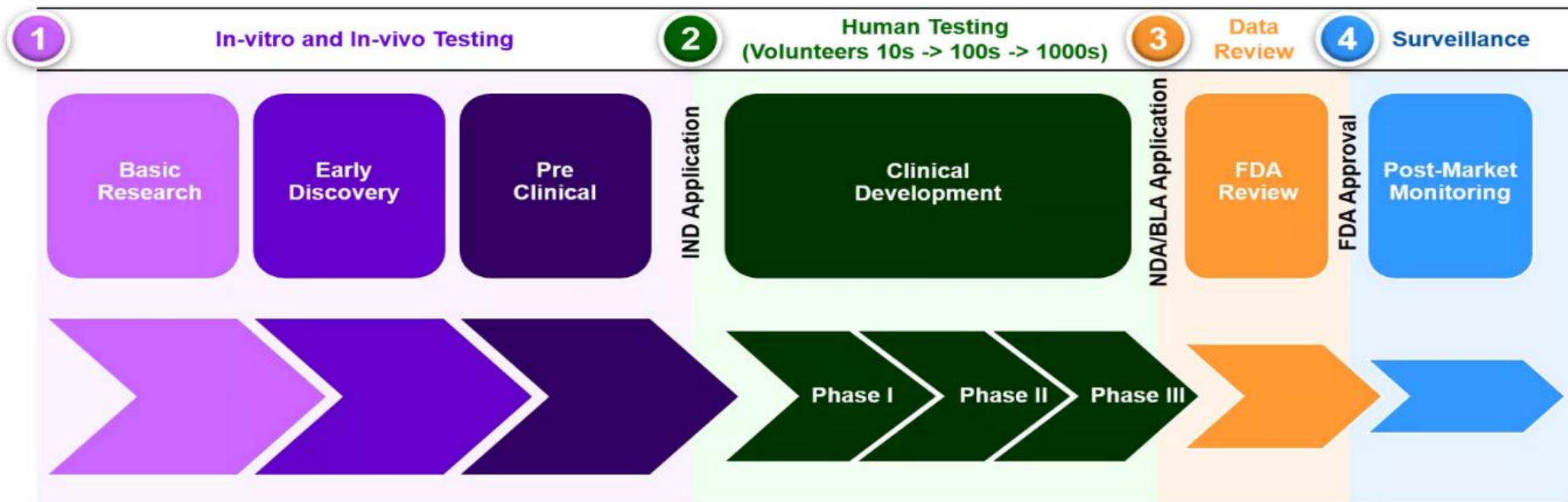
Improving the quality of patients' lives

Health care providers are insulated from unpaid bills, and patients reduce their inaccessibility.

Potentially beneficial for the institution because it reduces bad debt for covering medical costs

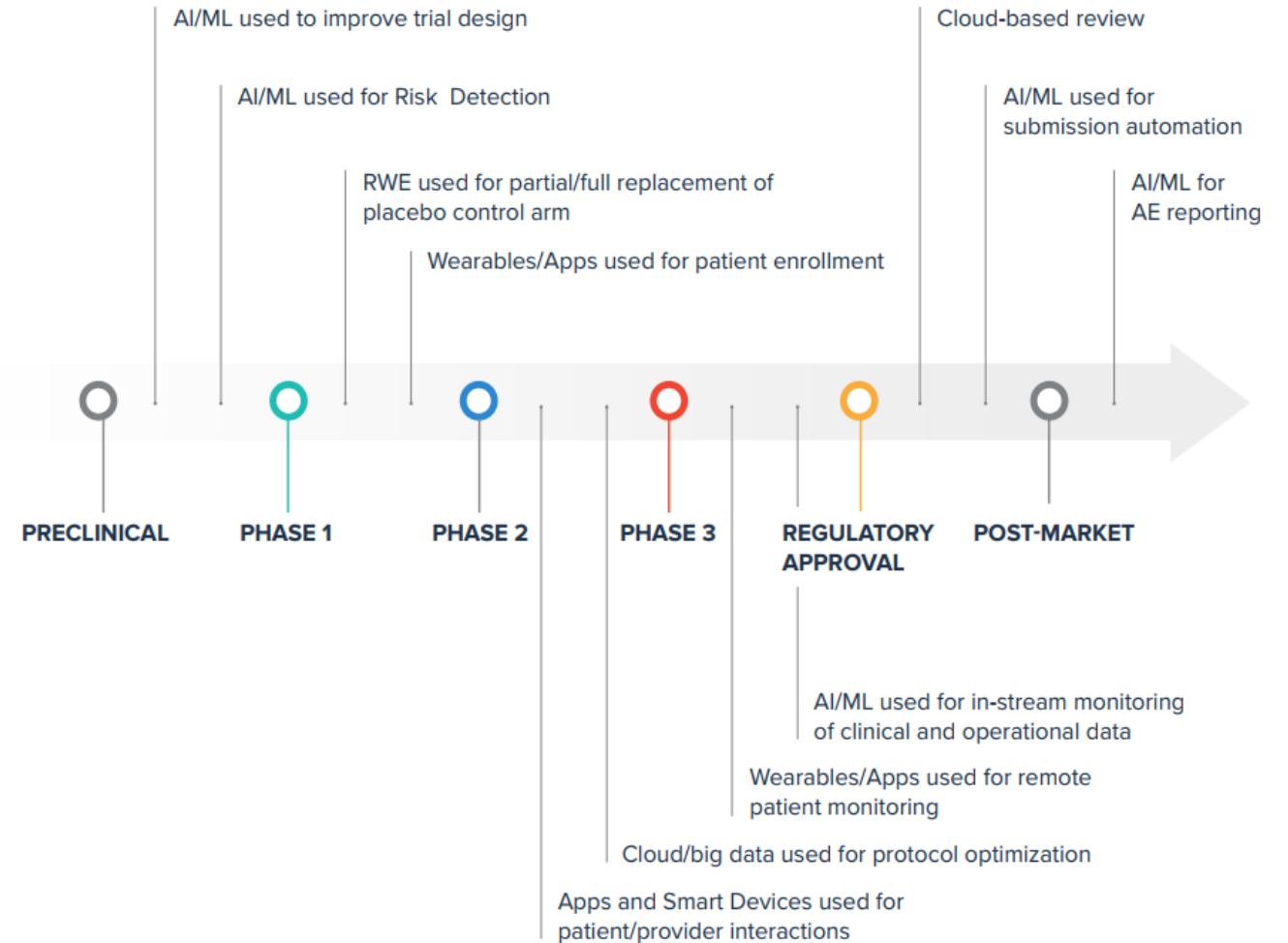
Drug Discovery(using AI and ML): -

The evaluation of hundreds or even thousands of chemical compounds is a multi-step, iterative process in the creation of new chemical compounds, depending on how well each one works against unique disease-related targets. A funnel can be used to represent the drug development process, with only a select few molecules moving on to the following phase.



Clinical Trials

- Digital health technologies adopted by pharmaceutical companies for clinical trials:
- Digital medicine
 - Telemedicine
 - Electronic informed consent (eConsent)
 - Digital data collection tools
 - Remote site monitoring
 - Direct to patient shipping (DtP)
 - Medication reminders



Digital initiatives by Big Pharma Giants.

COMPANY	DIGITAL INITIATIVES
AstraZeneca	1. Quire.ai - A.I. solutions in developing markets to detect lung cancer at an early stage, and hence reduce associated mortality rates. 2. Digital health platform for heart failure and asthma management in a real-world setting. 3. NVIDIA and the University of Florida for a new drug-discovery project. 4. Renalytix AI - Assign a risk score to chronic kidney disease patients
Takeda	1. Focuses on sleep disorders. It develops headphones to monitor and promote sleep onset through neuromodulation.
Boehringer Ingelheim	1. Digital therapeutics (DTx) - DTx solution for patients with schizophrenia The software will help patients in adjusting their behavior by leveraging cognitive and neurobehavioral mechanisms.
Pfizer Australia	1. ResApp smartphone apps for the diagnosis and management of respiratory diseases, such as pneumonia, asthma, bronchiolitis and chronic obstructive pulmonary disease (COPD).

Digital Trends in US, Europe pharmaceutical industry

Trends	Companies
Artificial Intelligence	Pangaea Data – Patient Cohort Identification InVivo AI – Drug Discovery
Big Data & Analytics	Pryml – Secure Data Collaboration Pomicell – In-Silico Modeling
Precision Medicine	ExactCure – Drug Exposure Model
Additive Manufacturing	FabRx – Printed Pill
Blockchain	PharmaTrace – Smart Contracts Veratrak – Pharma Supply Chain
Extended Reality (XR)	Nanome – VR Collaboration Tool Goodly Innovations – AR Suite
Real-World Data	Graticule – Unstructured Patient Data OncoChain – Oncological Data
Digital Therapeutics	Cognivive – Neuro-Rehabilitation Dopavision – Eye Treatment

Examples-

Trends	Application
Artificial Intelligence-	• Manage the process of clinical trial databases • AI is also used to reduce cost of developing new drugs • A lot of companies, including Google, are already involved in this field. The first use of AI in the pharmaceutical industry was by Pfizer.
Big Data & Analytics	• Reduce the cost and speed up clinical trials by identifying and analyzing various data points
Precision Medicine	• Focuses on disease treatment and prevention, and takes into account the variability in genes, environment and lifestyle between individual patients.
Blockchain	• Ensure that there is reliable, accurate data and a single reliable version of the truth that is shared by every participant in the pharmaceutical manufacturing and supply chain
Real-World Data	• Track long-term safety, tracking market access, and cost-effectiveness. Digital Therapeutic
Additive Manufacturing	• Allow a high level of control over when a drug is released within the body and how the pharmacodynamics of the drug can be altered by changing its composition and shape.

Competition analysis

TYPE OF PROJECT	COMPANY	BUSINESS FUNCTION	TRENDS IN USE	RESULT
Process improvement	Teva pharmaceuticals	Manufacturing	Insilco technology for predictive biomanufacturing: • Based on computer simulation and AI	• Saved experimental efforts and time • Optimized production processes
Process improvement and innovation	GSK	Research and Development	R&D Information Platform (RDIP) • Used advanced data analytics, AI and ML	• Creation of virtual products • Smooth decision-making process for the scientists
Process improvement and innovation	Pfizer	Supply chain and logistics	Digitised supply chain network using cloud computing	• Complete visibility into the status of product • Improved demand forecasting accuracy



Challenges in Digital Health

- Cybersecurity
- Regulating adaptive A.I. algorithms
- Hacking medical devices**
- Ransomware attacks on hospitals**
- Technologies supporting self-diagnosis
- Bioterrorism**
- A.I. not tested in a real-life clinical setting**

What Challenges Still Lie Ahead for Healthcare's Digital Transformation?

1.Security Remains a Focus in Healthcare

Cybersecurity is a critical area of concern for healthcare systems.

Malicious attacks can lead to a disruption of care, resulting in patient harm and adverse medical events.

For example, the probability of a ransomware attack on a hospital database through a patient-connected device may be low just because the database is within a private network. But such an attack can tremendously damage the hospital's reputation and breach patient privacy. Such challenges need constant monitoring and counter-remedies.

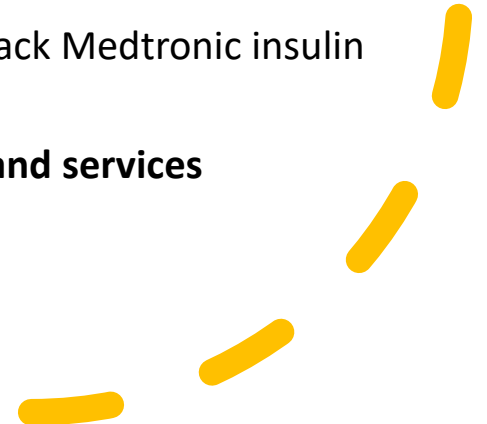
2.Regulating adaptive A.I. algorithms

An **adaptive artificial intelligence** (A.I.) is one that can adapt itself on-the-go based on new information it receives.

3.Hacking medical devices remotely

Back in 2011, a **researcher** showed that it was possible to hack Medtronic insulin pumps to deliver fatal doses to diabetic patients.

4.Privacy breaches by and on direct-to-consumer devices and services





5.Ransomware attacks on hospitals

When talking about cyber threats in healthcare, the most common ones are **ransomware**. These involve hackers who infect IT systems with malware or digital viruses to encrypt crucial files.

6.Technologies supporting self-diagnosis

Physicians are worried because patients Google their symptoms and treatments as they might wrongly associate the information, they find more with more serious conditions than what their caregiver diagnoses them with.

7.Bioterrorism through digital health technologies

With the convenience and enhanced medical solutions brought about by the interconnected world of digital health technologies, **bioterrorism** also propels to new levels.

Now with Neuralink, Elon Musk wants to **embed a “Fitbit in your skull”**, while startup **NaNotics** is developing nanorobots that **“mop up” molecules** that trigger diseases and ageing from the circulation. With such advanced technologies on the horizon, are we equipped to prevent bioterrorists from hacking into these devices to directly gain control over our health?





Solution

- The use of multifactor authentication is known to establish confidence in authenticating users, especially using at least one biometric as a factor. Ensuring encryption of sensitive information both at the data and transport layers is also critical.
 - The data management in the cloud or on-premise should also be fortified. While it is advisable to limit the capture and exchange of any sensitive data, it is mandatory to seek consent from the owner before collecting and sharing such information.
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Recommendation & Conclusion

- Integration of AI and ML in drug discovery and E-prescription.
- Using digital technologies and devices in Clinical trials.
- Using of Blockchain, AI, ML, IoT, RFID (Radio Frequency Identification) in Supply Chain Management.
- We need to concentrate on patient centricity in case of PAPs/PSPs.
- Using of Predictive Analytics in Production & Maintenance
- With the help of Technologies like Advanced Analytics, AI to monitor the quality levels, Cloud based platforms enables Real-time Tracking & ML to address drug Safety in Pharmacovigilance.



Testimonies by CEO of Pharma Giants.

- “Pfizer is starting to support patients, physicians and payers in a very different way than in the past,” “We are learning about blind spots in patients’ journeys and working to use insights from data, as well as digital solutions, to deliver a more integrated experience. We want patients, their caregivers and health care providers to ‘sync’ in real time to meaningfully improve experiences and outcomes.” - Lidia Fonseca (Executive Vice President, Chief Digital and Technology Officer at Pfizer)
 - I see a future in which all medical devices would be smarter, connected to the cloud, being able to provide data to the surgeons for them to be able to in real time deliver better surgical outcomes,” - Duato, CIO at Johnson and Johnson
 - Next decade will transform health care more than past century:- Joaquin Duato, Johnson & Johnson CEO
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Thank You