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A Review on In Details of the Pharmacovigilance

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ABSTRACT
Pharmacovigilance is defined by the World Health Organization (WHO) as the science and actions pertaining to the identification, evaluation, comprehension, and avoidance of side effects or other issues associated with medications or vaccinations. Drug safety is another term for pharmacovigilance. Making sure a medicine's benefit-risk ratio stays favorable over the course of its life cycle is a crucial public health role. Pharmacovigilance includes the measurement, identification, and recording of drug-related issues. Reducing the number of drug-related injuries in healthcare systems also involves improving our understanding of the factors and mechanisms that contribute to these injuries. This review emphasizes the critical role that pharmacovigilance plays in guaranteeing medication safety, raising the standard of healthcare, and protecting patients' health and welfare. It provides a thorough resource to help academics, policymakers, and healthcare professionals comprehend and advance an important aspect of medical practice. Initiated in 1986, pharmacovigilance in India was based on a formal adverse drug reaction (ADR) monitoring system, overseen by the Indian drug controller. In 1998, India became a part of the WHO's International Drug Monitoring Programme.
Clinical Research, ICH Good Clinical Practice, the New Drug and Clinical Trails Rule 2019, the Pharmacovigilance Concept, the Pharmacovigilance Programme of India (PvPI), the Drug Controller General of India (DCGI), and the Central Drug Standard Control Organization (CDSCO) will all be covered in this review.

KEYWORDS: Pharmacovigilance (PV), Adverse Drug Reaction, Drug Safety, Healthcare Review, Pharmacovigilance Programme of India, Central Drugs Standard Control Organization (CDSCO)

I. INTRODUCTION

W. McBride, an Australian physician who first hypothesized a relationship between thalidomide, a medication taken during pregnancy, and severe fetal abnormalities (phocomelia), published a letter (case report) in the Lancet in December 1961, marking the official introduction of pharmacovigilance (PV): In order to help pregnant women feel less queasy and drowsy, thalidomide was prescribed. [1]

The "Programme for International Drug Monitoring" was a pilot project launched by the World Health Organization (WHO) in 1968 with the goal of centralizing global data on adverse drug reactions (ADRs). Finding the earliest PV indications was specifically the "WHO Programme's" primary goal. A French group of pharmacologists and toxicologists coined the term "periodic vomiting" (PV) in the middle of the 1970s to describe actions that promoted "the assessment of the risks of side effects potentially associated with drug treatment".[2]

Pharmacovigilance encompasses the scientific study and practice of identifying, evaluating, comprehending, and averting side effects or any other medication-associated issue. It is crucial to patient care and the sensible administration of medications. The terms adverse drug reaction monitoring, drug safety surveillance, side effect monitoring, spontaneous reporting, post-marketing surveillance, and other variations are also used to refer to it. The safety of all medications, including herbal and complementary therapies, vaccines, and biological materials, is monitored as part of pharmacovigilance.

While pharmacovigilance (PV) is widely used in most developed nations, its application varies among low- and middle-income nations; some have no system at all, while others have systems that are on par with the finest in developed nations. The World Health Organization, at the request of the Global Fund against AIDS, Tuberculosis and Malaria (Global Fund) and important multilateral and technical institutions, has launched an extensive and thorough consultative process, given the significance of pharmacovigilance for all countries. [14]

Since all medications are used in healthcare settings, it is imperative that their safety be continuously evaluated. Operation of a pharmacovigilance system is consequently mandated

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by EU law for all holders of marketing authorizations, national competent authorities, and EMA. Cooperation between the European Commission, EMA, and EU Member States is essential to the overall operation of the EU pharmacovigilance framework. The national competent authority coordinates the operation of regional Commissional centers in certain Member States .[17]

Working Of Pharmacovigilance :

- Comprehensive Clinical Pharmacovigilance,
- Risk management Plan,
- Assigning A Qualified person Responsible for PV ,
- Single Direction And Management ,
- Safety Writing And Aggregate Reporting,
- G×P Adults. [34]

Pharmacovigilance within the industry aims to protect patients from needless harm by identifying drug hazards that were previously unknown, clarifying predisposing factors, disproving false safety signals, and weighing risk versus benefit. These objectives are essentially the same as those of regulatory agencies. Companies and regulatory bodies may have differing viewpoints, but they increasingly collaborate and exchange information more frequently. Nevertheless, central pharmacovigilance teams inside large pharmaceutical corporations frequently possess significantly superior resources and a far higher level of "in-house" knowledge regarding the safety of their specific medicines. [6]

Although PV is still in its early stages of development, the idea is not new to India: in 1986, a formal ADR monitoring system covering 12 regional centers with a combined population of 50 million was proposed for India; six regional centers were established in 1989 under the auspices of the drug controller of India: in Mumbai, New Delhi, Kolkata, Lucknow, Pondicherry, and Chandigarh; and in 1997, India became a member of the WHO Programme for International Drug Monitoring, which is overseen by the Uppsala Monitoring Centre, Sweden.

The WHO special center is located in Mumbai at KEM Hospital, whilst the national center is located in New Delhi at the Department of Pharmacology, AIIMS. Only the two centers in Mumbai and New Delhi were operational out of the six, although the quality of ADRs that were reported on their own was low. The monitoring centers had significant limitations because they were viewed as ad hoc and because adequate financing was not provided. India's government submitted a funding proposal to the World Bank after realizing the country needed better ADR monitoring. The National Pharmacovigilance Programme (NPVP) was established in November 2004 after the World Bank approved the proposal with an annual funding of US$0.1 million for five years. [7]

It Is generally acknowledged that pharmacovigilance plays a major part in early detection of the risk related to the medication. Before being licensed for post-marketing surveillance, all medications are tested on a small but representative population. Pharmacovigilance is known to play a number of roles, including the identification, measurement, and documentation of drug-related issues; improving knowledge and comprehension of the factors and mechanisms that lead to drug-related injuries; and helping to lower the risk of drug-related issues in healthcare systems. [8]

II. CLINICAL RESEARCH

Healthcare providers and patients need to be informed about the possible hazards of drugs through PV in clinical studies. A medication's safety and efficacy in real-world settings can be monitored by postmarketing drug safety surveillance, which the pharmaceutical corporation may help with as pre-approval studies cannot foresee every potential side effect. One can employ several strategies, including electronic health records, drug registries, and mechanisms for spontaneous reporting. [9]

CLINICAL TRAILS

Human volunteers who provide their consent to engage in investigations are used in clinical trials. The purpose of these clinical studies is to investigate the efficacy and safety of medications, medical devices, vaccines, and other biologic therapies. In addition, these trials may evaluate novel applications for currently prescribed medications. [10]

A pharmaceutical corporation participating in the development of a medicine and an investigator closely oversee the trials. Still, an impartial assessment by drug safety companies is beneficial to the process as well. In line with this procedure, pharmacovigilance adds an additional layer of protection to guarantee that patients only receive safe and efficient products. Developing the finest care possible for patients and customers worldwide is the responsibility of medication developers, producers, pharmaceutical systems, and investigators as part of global healthcare .

A pharmaceutical company cannot apply for the market authorization of a novel medicine until it

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has completed Phase I, II, and III clinical studies. They oversee the conduct of the study and provide the results to the sponsor, the pharmaceutical business. Serious adverse events (SAEs) that occur during clinical trials are gathered and analyzed by the analyst to determine if the drug under consideration was the cause or not. Adverse drug reactions (ADRs) are defined as such if they determine that the unfavorable side effects were the cause.[9]

Phase I

A Phase I trial aims to do the following:

- Decide if administering the new medicine by mouth or via vein is the most effective method.
- Check for indications that the new treatment is having an effect on the cancer. [12]

Verifying the treatment's safety in humans and figuring out how and where it spreads throughout the body are the goals of phase one. A modest number of well volunteers participate in this testing typically. The sponsor of the study keeps an eye out for any potentially harmful, undesired, or unwanted side effect that could result in mortality or pose a threat to health, such as a heart attack, birth defect, permanent impairment, or other major medical issue.

At the conclusion of Phase 1, the results are collected, analyzed, and submitted to the FDA for approval to move on to Phase 2 clinical trials. However, if the results demonstrate that the treatment was associated with one or more major adverse events, the FDA may refuse approval to proceed to Phase 2. Normally, testing of that treatment is halted or "drops out" of contention for market approval. If the trial achieves the primary outcome(s) outlined in the initial study design, the FDA allows the treatment to advance to Phase 2 Clinical Trial(s)

Sometimes a medicine that has the potential to treat one condition has already been licensed for use in another. This is known as "repurposing" a medicine, and it may reduce the clinical trial or allow for an acceleration into Phase 2 Clinical Trials because the Phase 1 safety profile was already tested in the previous clinical trial. [11]

Phase II

Phase II trials are intended to further evaluate safety and determine whether the new medication has sufficiently promising efficacy to warrant an extensive randomized phase III trial for future study. Usually a few hundred people are included in these investigations. [3]

A clinical trial's phase II includes several hundred volunteers who have the ailment that the novel drug is intended to cure. The dose that was determined to be safe in the preceding phase is typically administered to them. For a number of months or years, participants are observed by researchers to assess the efficacy of the medication and to learn more about any potential adverse effects.

Phase II is not yet large enough to show the overall safety of a medicine, despite having more participants than previous phases. However, the information gathered in this stage aids investigators in developing phase III procedures.

About 33% of drugs, according to FDA estimates, advance to phase III trials. [13]

Phase III

Hundreds to thousands of patients throughout or worldwide may participate in phase III trials. A patient participating in a Phase III clinical trial may be assigned to one of the following groups:

- The group receiving conventional care is known as The Control Group.
- The group receiving the novel treatment under test is called The Study Group. [12]

Finding out if the treatment would be safe and effective for a broad range of individuals is the main goal of a Phase 3 Clinical Trial, which entails a far greater number of volunteers. Participants are often divided into treatment and control groups as part of the plan. More than one treatment group may exist, particularly if the course of treatment entails the use of various medications or other components. Once more, a control group is included that is administered either a placebo or the current standard of care regimen.

Following the conclusion of Phase 3 Clinical Trials, the patients' conditions from each treatment group are contrasted with those of the control groups. Should the outcomes indicate that the treatment did not outperform the current standard of care, or even accelerated the disease or resulted in other unanticipated major adverse events, the FDA may refuse to authorize the application for a new drug application (NDA). The FDA has been asked to review this particular NDA before approving the treatment's commercialization. It encompasses all of the findings from every phase of the process, from Basic Research/Drug Discovery to the Phase 3 Clinical Trial results.[11]

Phase IV

Phase IV clinical trials take place following FDA approval of a drug. This phase, which can extend for several years, involves thousands of individuals. During this phase, investigators gather more data regarding the medication's long-term safety, efficacy, and potential benefits. [13]

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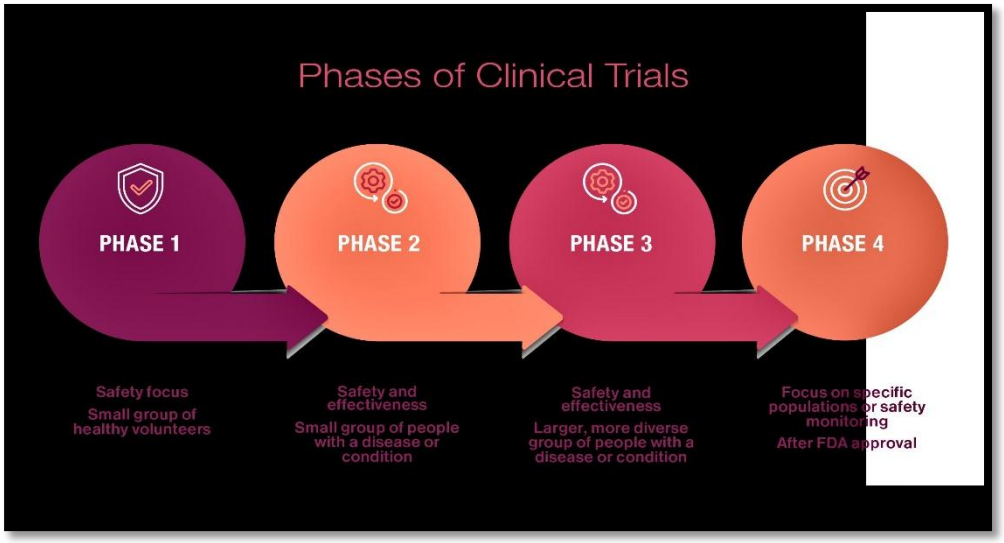

FIG. 1: PHASES OF CLINICAL [21]

DRUGS CONTROLLER GENERAL OF INDIA (DCGI)

The Central Drugs Standard Control Organization (CDSCO) is headed by the Drugs Controller General of India (DCGI) . The Ministry of Health and Family Welfare (MoHFW) is in charge of this organization . The 1940 Drugs and Cosmetics Act is the source of their authority.

Licenses for particular drug classes in India must be approved by the DCGI. Drug quality requirements and standards are also outlined in the DCGI. In India, it has to do with producing, distributing, importing, and selling medications. [31] The regulatory authority in charge of all pharmaceutical research and regulatory matters in India is the Drug Controller General of India (DCGI). Regulations have been put in place to safeguard the safety and well-being of research participants during clinical trials conducted in India. [32]

Responsibilities of the DCGI

Many tasks in the health sector are under the authority of the DCGI. Drug quality requirements and standards are also outlined in the DCGI. It has to do with producing, distributing, importing, and selling medications in India.

- The necessary reference standard for pharmaceuticals is prepared and maintained by it.
- Implementing the Drugs and Cosmetics Act of 1940 consistently is ensured by the DCGI.
- Training in this sector is conducted by the DCGI. The State Drug Control Laboratories' drug analysts as well as those from associated institutions receive training from it.
- When analyzing survey samples, the DCGI also examines cosmetics. Central Drugs Standard Control Organization is the source of this information.
- Under the Drugs and Cosmetics Act, it also authorizes the medications.
- Conducted clinical trials are managed by the DCGI. Drug standards are likewise set by the DCGI.
- Quality control over medications imported into the nation is also guaranteed by the DCGI.
- The numerous state drug control groups' actions are coordinated by it. [31]

CENTRAL DRUGS STANDARD CONTROL ORGANIZATION (CDSCO)

India's National Regulatory Authority (NRA) is the Central Drugs Standard Control Organization (CDSCO), which is part of the Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India. Six zonal offices, four sub zonal offices, thirteen port offices, seven laboratories, and FDA Bhawan, Kotla Road, New Delhi 110002 are located around the nation in addition to the organization's headquarters. [33]

Function of Central Drugs Standard Control Organization

- Clinical trials and the approval of new medications.
- Registration and licensing for imports.
- Licensing of LVPS, vaccines, pie-DNA products, blood banks, and certain medical equipment and diagnostic tools.

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- Drug and Cosmetic Act and Rules Amendment.
- Prohibition of both narcotics and cosmetics.
- Give NOCs for export, personal licenses, and test licenses.
- Central Laboratories tests pharmaceuticals.
- The Indian Pharmacopoeia is published.
- Tracking unfavorable medication responses.
- Direction on technical issues. [5]

In terms of regulation, it is headed by the DCGI and is primarily in charge of creating policies, coordinating the efforts of State Drug Regulatory Authorities, and guaranteeing the uniform application of the D and C Act throughout the nation. Clinical studies, the launch of new pharmaceuticals, the licensing of new drug imports, and other matters fall under the purview of DCGI. Only after receiving CDSCO approval can a medicine be produced in a state with a license. [35]

Organizational Structure of Central Drugs Standard Control Organization

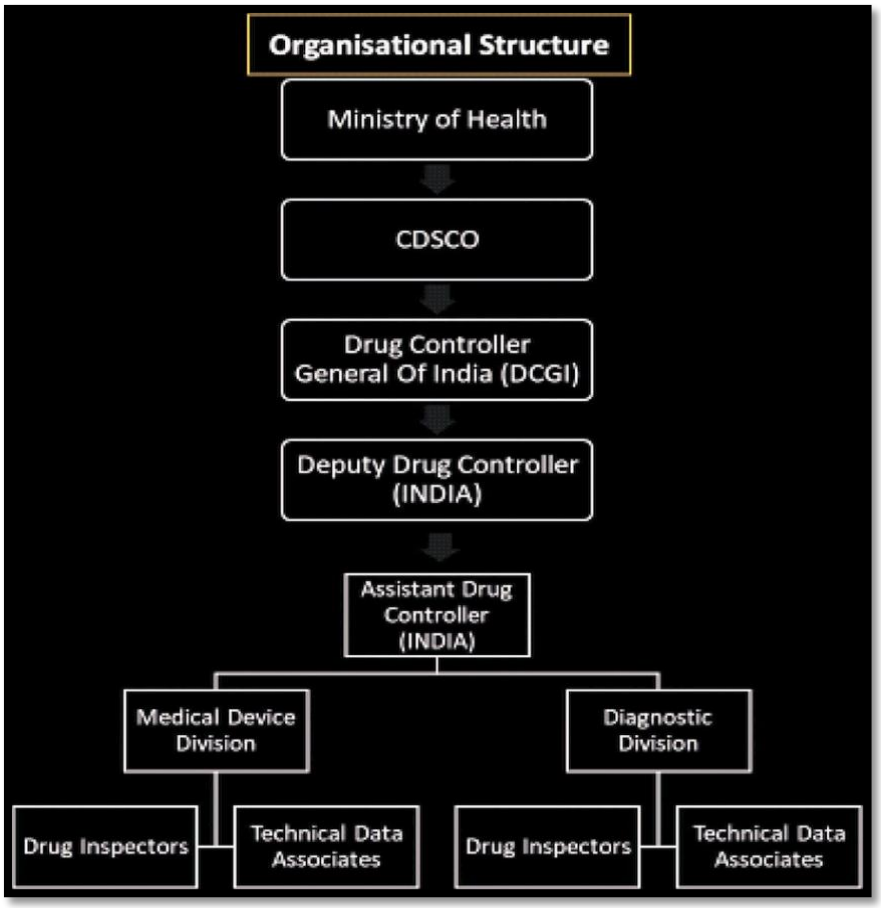

FIG. 2: ORGANIZATIONAL STRUCTURE OF CDSCO [35]

Zonal Office: Mumbai, Kolkata, Chennai, Ghaziabad, Ahmadabad, Hyderabad.
These facilities provide GMP audits and inspections of large-scale manufacturing facilities for blood, vaccination, sera, and parental goods.
Sub-zonal Office: Chandigarh, Jammu, Bangalore.
These centers interact with the state drug control authorities that fall within their purview in order to ensure uniform enforcement and inspection standards.

Central Drugs Testing Laboratories:

i. Central Drugs Laboratory, Kolkata.
ii. Central Drugs Testing Laboratory, Mumbai.
iii. Central Drugs Testing Laboratory, Chennai.
iv. Central Drugs Laboratory, Kasauli.
v. Regional Drugs Testing Laboratory, Guwahati.

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vi. Regional Drugs Testing Laboratory, Chandigarh. [5]

III. GOOD CLINICAL PRACTICE

An international ethical and scientific quality standard for clinical trial design, conduct, performance, monitoring, auditing, recording, analysis, and reporting is called "Good Clinical Practice," or GCP. It additionally functions to safeguard the trial subjects' rights, integrity, and secrecy.[15] Regardless of where in the world the trials have been conducted, the standard aims to guarantee the protection of the rights, safety, and well-being of the people chosen for these studies as well as the validity and dependability of the clinical trial data.[16]

ICH GOOD CLINICAL PRACTICE

The International Conference on Harmonization (ICH) has established the Guidelines for Good Clinical Practice (GCP), which is a global standard for the moral and scientific excellence of planning, carrying out, documenting, and disclosing trials in which human beings are involved. [26]

Principle

These are the 13 ICH-GCP fundamental principles, and they are :

i. Ethical guidelines originating from the Declaration of Helsinki should be followed when conducting clinical trials. These guidelines should also align with GCP and any relevant regulatory requirements.

ii. Before a study begins, the expected benefits for each trial participant as well as society as a whole should be considered in relation to the known dangers and inconveniences. Only when the expected benefits outweigh the hazards should a trial be started and carried out.

iii. The rights, security, and welfare of the test subjects are the most crucial factors and ought to take precedence over the goals of society and research.

iv. A proposed clinical study should be supported by sufficient nonclinical and clinical data on an investigational product .

v. Clinical trials must to be well-researched and documented in a precise, comprehensive methodology.

vi. The protocol that has already been approved by the independent ethics committee (IEC), the institutional review board (IRB), or both should be followed when conducting a trial.

vii. Only licensed doctors or, when applicable, licensed dentists should be responsible for the medical treatment provided to subjects and the medical decisions made on their behalf. [4]

viii. All trial participants ought to be equipped with the necessary education, training, and experience to carry out their assigned tasks.

ix. Before participating in a clinical experiment, each participant should provide their free and informed permission.

x. Every clinical trial data should be captured, managed, and preserved in a manner that facilitates accurate reporting, analysis, and validation.

xi. In compliance with the relevant regulatory requirement(s), the confidentiality of records that may reveal the identity of subjects will be safeguarded, adhering to privacy and confidentiality guidelines.

xii. All relevant Good Manufacturing Practices (GMP) should be followed in the production, handling, and storage of investigational items. The recommended protocol should be followed when using them.

xiii. It is important to put in place systems and procedures that guarantee the caliber of each and every trial component. [18]

NEW DRUGS AND CLINICAL TRIALS RULES 2019

On March 19, 2019, the Indian government unveiled the New Drugs and Clinical Trials (NDCT)Rules 2019 (New rules). The ethics committee (EC) now has more requirements because to new regulations. In accordance with the new regulations, the EC must abide by the standards and submit their report to the Central Licensing Authority (CLA). [19]

According to Rule 2(a) of the New Drug Clinical Trials Rules of 2019, an academic clinical trial is any clinical trial of a drug that has already been approved for a specific claim and that is initiated by a researcher, academic institution, or research group for a new indication, new dosage, or new dosage form. The outcomes of these trials are not to be used for marketing or commercial reasons, nor are they to be used to request permission from any nation's central licensing or regulatory authority.

The 2019 new drug clinical trials rules include a description of Rule X. A medicine intended to cure a condition that affects no more than five lakh persons in India is referred to as a "orphan drug". [20]

Features of the New Drugs and Clinical Trials Rules 2019

The new regulations defined terms such "trial subject," "similar biologic," "registered pharmacist," "orphan drug," "clinical trial site," "efficacy," "good clinical practice guidelines," and

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"post trial access." Furthermore, the Central Licensing Authority's (CLA) previous operations were unclear. As per the modified rule, the Central Government will designate the CLA as the Drug Controller General of India (DCGI), and the CLA will report to the CDSCO regarding their position and responsibilities. This regulation places a strong emphasis on the composition, requirements, registration, and duties of the ethics committee. It separates the roles of the ethics committee in biomedical research, bioequivalency studies, and clinical trials.

Compensation for catastrophic adverse effects and mortality experienced by clinical trial participants is a major emphasis of the new rule. Penalties have been imposed at several levels, including license revocation, prohibitions on conducting additional clinical trials in India, blacklisting of the investigator and study center, debarring of the Contract Research Organization (CRO), fines, punishments, and both. Moreover, it has shortened the licensing process, established the notion of orphan pharmaceuticals, and included provisions for university clinical trials. [38]

Objective of New Drugs and Clinical Trials Rules 2019

The new regulations provide researchers more freedom and include a deadline for evaluating proposals. They are meant to support clinical research and provide accountability and predictability in the regulatory procedure.

- The encouragement of research and development in India is the main goal.
- Quicker access to the new medication.
- Transparency and predictability in the approval procedure.
- To cut spending and healthcare costs.
- To ensure the quality assurance of clinical research conducted in India, the safety and wellbeing of trial participants, and the integrity of the data.[41]

IV. CONCEPT OF PHARMACOVIGILANCE

PHARMACOVIGILANCE

Definition of Pharmacovigilance

The scientific study and practice of detecting, assessing, understanding, and preventing side effects or any other problem related to drugs or vaccines is known as pharmacovigilance. The prevention and treatment of disease have been transformed by vaccinations and pharmaceuticals. [14]

Drug-related problems are identified, measured, and recorded as part of pharmacovigilance. Improving our appreciation of the elements and processes leading to drug-related injuries also helps to reduce risks in healthcare systems .

According to the European Commission, pharmacovigilance is the science and practice of monitoring medication safety in order to minimize risks and maximize benefits. It entails tasks including gathering and keeping track of safety data, examining each case report for possible problems, controlling risks in advance, and interacting with relevant parties. [24]

Objective of Pharmacovigilance

- Ensuring patient safety and quality of care while using medications in conjunction with medical and paramedical interventions is still a critical dimension.
- Pharmacovigilance aims to demonstrate the effectiveness of medications by tracking any significant side effects and improving public health and safety when it comes to drug use.
- It also promotes the safe, prudent, and economical use of medications, educates the public about pharmacovigilance, and provides clinical training in this area. Finally, it involves communicating effectively with the general public. [22]
- In addition, educating patients, healthcare professionals, and regulators on safe medication use is crucial to achieving the goals of pharmacovigilance research. Programs and methods for gathering and evaluating patient and clinician reports are also designed. [23]
- Enhance patient care and well-being in accordance with medication use.
- Improve public health and safety in accordance with medication use.
- Identify problems related to medication use and communicate findings quickly.
- In order to prevent mischief and increase benefits, it is important to contribute to the evaluation of the benefits, risks, viability, and hazards associated with pharmaceuticals.
- Encourage the sensible, economical, and safe use of medications, including those that are cost-effective.
- Preliminary agreement, guidance, and clinical training in pharmacovigilance and its strong correlation with the broader population.[39]

Need of Pharmacovigilance

- A product's safety may be questioned if there is insufficient evidence from human trials, animal testing, or the phases 1 through 3 of research

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that must be completed before the product is approved for sale.

- The goal of medicines is to prolong and enhance life. Although it is often inevitable to pass away from a sickness, it is unacceptable to suffer injury or even die as a result of treatment.
- The expenditures associated with adverse drug reactions are greater than the actual cost of prescription drugs, underscoring the nation's financial burden that goes beyond drug costs.
- Promoting responsible drug use and making sure patients adhere to recommended course of care.
- Establishing public trust.
- It is unethical and morally immoral to withhold information regarding damage from someone who is not aware of it. [24]
- Since clinical trials are only examined for a limited amount of time and with a small number of carefully chosen patients in carefully chosen settings, it is very challenging to effectively assess the efficacy, side effects, and overall risk-benefit ratio in a real clinical context. [37]

After being introduced to the market, novel and medically developing medicines must be closely observed for efficacy and safety in everyday situations. More data is typically required about the effectiveness and safety of long-term use in conjunction with other medications, as well as usage in particular population groups like children, pregnant women, and the elderly.[25]

Significance of Pharmacovigilance

There are still a lot of unanswered questions about the safety of newly introduced drugs on the market. These medications are used by different people for different conditions. These patients may also be taking several medications and should adhere to varied diets and habits, which may negatively impact the medication's effect on them.

Furthermore, an identical drug may be produced differently. Furthermore, pharmacovigilance is necessary to monitor adverse drug reactions (ADRs), which can also occur when pharmaceuticals are taken with conventional and herbal remedies. ADRs, or adverse drug reactions, can occasionally occur in a single country or area for a particular prescription. With the aid of experts, drug specialists, attendants, and other national health experts, pharmacovigilance becomes an important monitoring mechanism for pharmaceutical safety in a nation, preventing any unnecessary suffering that patients may experience on a physical, emotionally, or financially basis.[39]

Pharmacovigilance Processes

Monitoring drug safety is a straightforward technique known as pharmacovigilance. It is one of the most important departments in the pharmaceutical industry. Prior to exploring the specifics of this procedure, let's think about a few important points. The pharmacovigilance division, also known as the Safety Team, works in tandem with the pharmaceutical industry's regulatory, clinical, and non-clinical sectors. This group is in charge of continuously observing the safety of pharmaceuticals intended for human consumption. They are essential in creating regulatory papers for new Marketing Authorization Holder (MAH) applications in addition to overseeing product safety.

To assure the safety of pharmaceuticals for all parties engaged in medication development, marketing, and administration, pharmacovigilance is a sophisticated system rather than a simple process. It takes a complex process with several steps to share such data. "Detection, assessment, understanding, and prevention of adverse effects or any other drug-related problems" is the definition of pharmacovigilance given by the World Health Organization (WHO).

The definition categorizes pharmacovigilance processes Into four types:

Stage 1. The pharmacovigilance process: identification and gathering of individual case safety reports (icsrs)

- Sources that were contacted and obtained through focused data collecting (i.e., creating a channel to gather negative impacts)
- Unsolicited sources are those that are obtained spontaneously or without a request.

Stage 2. Pharmacovigilance procedure : evaluation

- Triage
- Data input and
- Query processing
- Review and feedback from medicine
- Case closure

Stage 3. Pharmacovigilance process (stage 3): comprehending the profile of medication safety

Stage 4. The fourth stage of the pharmacovigilance procedure is to prevent unfavorable global regulatory framework. [40]

PHARMACOVIGILANCE PROGRAMME OF INDIA

The All India Institute of Medical Sciences (AIIMS), in New Delhi, acts as the National Coordination Centre for monitoring Adverse Drug Reactions (ADRs) nationwide in order to protect public health. The Pharmacovigilance Programme of

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India (PvPI) was launched by the Indian government on July 14, 2010. 22 ADR monitoring centers, including AIIMS in New Delhi, were established in 2010 as part of this program [27] . PvPI's primary responsibility is to effectively monitor Adverse Drug Reactions (ADR) by establishing a number of Adverse Drug Reaction Monitoring Centers (AMC) around India and providing training to those who would carry out this duty.[28]

Objective Pharmacovigilance Programme of India

- The aim is to evaluate the risk-benefit ratio of marketed global pharmaceuticals.
- To provide information on medication safety that is supported by evidence.Aid regulatory bodies in making decisions on the administration of pharmaceuticals.
- To reduce risk by informing different stakeholders about the safety information on the usage of medications.
- Ascending to become a leading national hub for pharmacovigilance endeavors.
- To cooperate with more national hubs for data management and information sharing.
- To assist other national pharmacovigilance centers situated worldwide with training and consulting services. [27]
- Establish a national framework for patient safety by making sure that drugs are safe.
- Find and evaluate fresh indications from the cases that have been reported.
- Examine the benefit-risk ratio of pharmaceuticals that are sold.
- Provide evidence-based data regarding medication safety.
- Assist regulatory bodies in making decisions on the usage of drugs.[43]

Mission of Pharmacovigilance Programme of India

The purpose of PvPI is to protect public health by making sure that the advantages of medicine outweigh the hazards.

- Monitoring ADRs in the Indian population is the first goal.
- Raise knowledge among medical professionals about the significance of reporting adverse drug reactions in India.
- Track a medication's benefit-risk ratio.
- Produce impartial suggestions regarding the safety of medications, grounded in empirical data.
- Help the CDSCO make safety-related regulatory decisions regarding medications.[29]

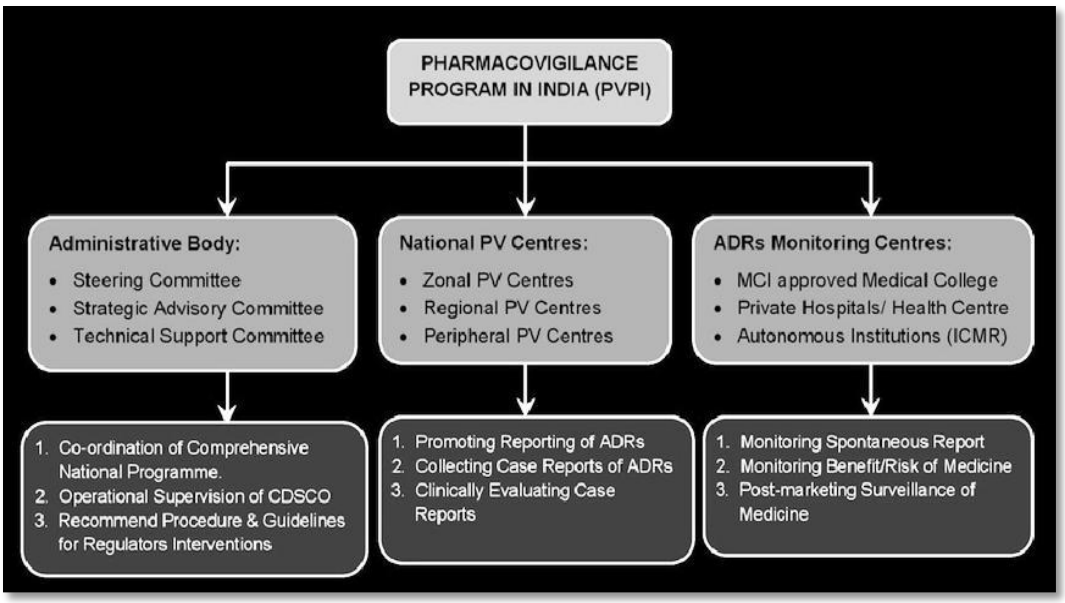

FIG. 3: PHARMACOVIGILANCE PROGRAM IN INDIA AND RESPONSIBILITIES[30]

Structure and functions of PvPI

Primary stakeholders in this plan are patients, healthcare providers, and the pharmaceutical business. Post-marketing Periodic Safety Update Reporting (PSURs) is legally needed for every medication or medical product that the

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concerned producer has been granted approval by CDSCO to market in India. When submitting PSURs to CDSCO, they always go beyond an internal evaluation. The ADRs Monitoring Centers (AMCs) that each healthcare provider is affiliated with can receive reports of adverse events linked to pharmaceuticals marketed in India. These reports are then Forwarded to the NCC via VigiFlow.

Many panels and organizations at NCC-PvPI, IPC Ghaziabad compile and assess the given data for quality. The reports must be turned up to Sweden's Uppsala Monitoring Centre (UMC), and NCC is in charge of informing authorities of the scientific findings.In order for CDSCO to take regulatory action, NCC must submit the reports to the Uppsala Monitoring Centre (UMC) in Sweden and inform them of the scientific findings.[29]

ADVERSE DRUG REACTIONS MONITORING CENTERS (AMCS)

Two hundred and two(202) Adverse Drug Reactions Monitoring Centers (AMCs) are operational throughout the nation, providing information about adverse drug reactions to the Pharmacovigilance Program of India (PvPI) and National Coordination Center (NCC).Currently operating AMCs are corporate and teaching hospitals that have received approval from the Medical Council of India (MCI). [42]

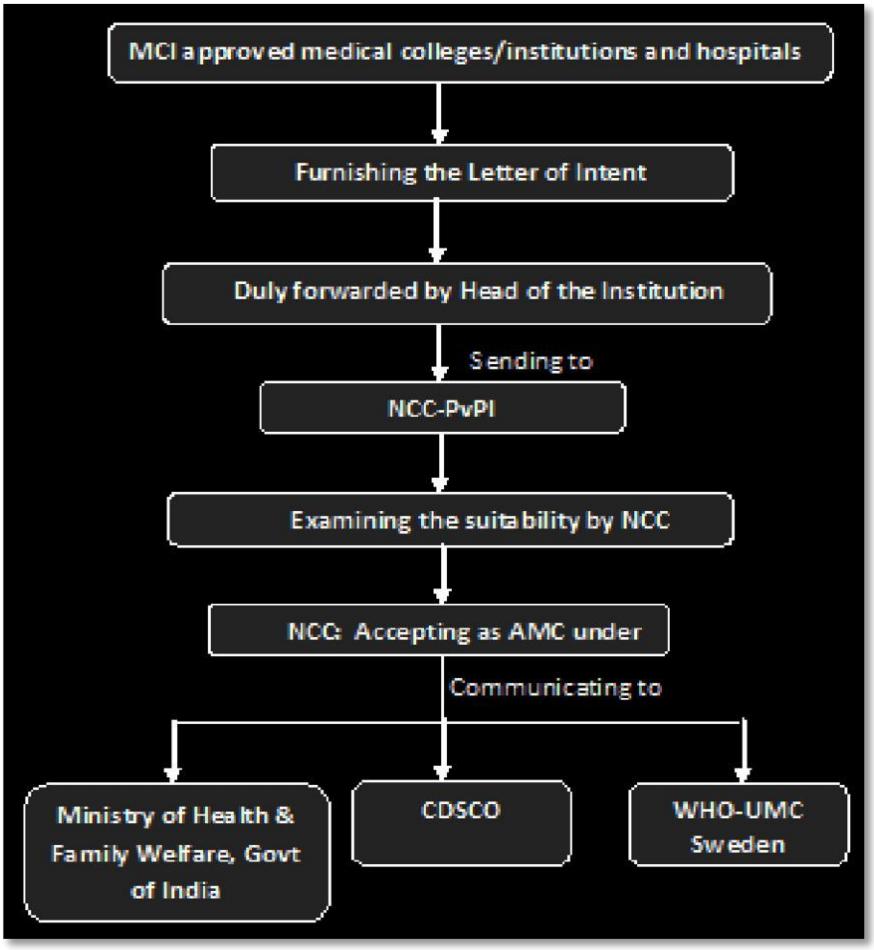

FIG. 4: PROCESS OF INDUCTION OF AMC'S UNDER PVPI[36]

According to the Indian Pharmacopoeia Commission (IPC), which is part of the Ministry of Health and Family Welfare, Government of India, the institute was named an Adverse Drug Reaction (ADR) Monitoring Center under the Pharmacovigilance Programme of India (PvPI) in December 2012. In the Department of Pharmacy, the HOD of Pharmacology serves as the Coordinator for the ADR Monitoring (Pharmacovigilance) Center (AMC).[44]

ADR reports from patients are collected and followed up on by ADR Monitoring Centers (AMCs)

under PvPI. They are positioned all over India to gather data from patients on adverse events. These AMCs are medical colleges and hospitals, corporate hospitals, public health programs, and medical/central/autonomous institutes that have been approved by the Medical Council of India (MCI). As per Standard Operating Procedures (SOPs), they are in charge of gathering information from patients about adverse events, following up with them to confirm that the ADR reports are complete, entering the data into the designated software (Vigiflow), and sending the data to NCC via the same software. Additionally, certain AMCs are in charge of regional technical assistance and training.[42]

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