




THE CURRENT STATUS AND NEED OF PHARMACOVIGILANCE CENTERS IN THE HOSPITALS TO MINIMIZE THE DRUG PROBLEMS

Krupavaram.B¹, Sailaja Nandennagari², Heamavathi.S³ , S.Lakshmi Savithri⁴, Prabin Kumar Mishal⁵,
Vinjavarapu. L.Anusha⁶, Syed Abdul Jabbar Basha^{7*}

¹ School of Pharmacy, KPJ Healthcare University College, Nilai, Kota Seriemas, Malaysia

² School of Medicine, Avalon University of School of Medicine, Willemstad, Curacao, North America

³ PG Scholar, Department of Pharmacology, Government Siddha Medical College, Arumbakkam, Chennai, India

⁴ Associate Professor, Department of Pharmaceutics, SIMS College of Pharmacy, Guntur, Andhra Pradesh, India

⁵ Assistant Professor, Gayatri Institute of Science and Technology, Gunupur, Rayagada, Odisha

⁶ Associate Professor, Department of Pharmacology, SIMS College of Pharmacy, Guntur, Andhra Pradesh, India

⁷ Associate Professor &HOD, Department of Pharmacology, Sana College of Pharmacy, Kodad, Telangana, India

*Corresponding Author

Syed Abdul Jabbar Basha

Associate Professor &HOD,

Department of Pharmacology,

Sana College of Pharmacy, Kodad, Telangana, India

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Abstract

The science and exercises identifying with the identification, appraisal, comprehension and counteractive action of antagonistic impacts or some other medication related issue". It is a vital and indistinguishable piece of clinical research. Both clinical preliminaries safety and post-showcasing pharmacovigilance are essential all through the item life cycle. With a sensibly high number of late prominent medication withdrawals, both the pharmaceutical business and in addition different administrative offices over the globe have expanded the bar. Early flag identification from the post- advertising observation thinks about and clinical preliminaries in early stages have now been adjusted by significant pharmaceutical organizations so as to recognize the dangers related with their therapeutic item/s as right on time as could be expected under the circumstances. The indications of ADRs rely upon the age, sex, hereditary, poly pharmacy, portion exactness and ecological and other interior variables like illness conditions. ADRs ordinarily answered in because of known or obscure pharmacological highlights, poor item quality, prescription mistakes in recommending, getting ready, overseeing, or taking the medicine which requires hospitalization. ADRs in hospitalized patients can be partitioned into two classes: those that are the reason for clinic confirmation and those that happen amid hospitalization. A strengthening and commitment of network pharmacists to patient record check and electronic announcing may likewise lessen ADR related occasions. Without successful distinguishing proof and satisfaction of preparing needs of pharmacists and other medicinal services experts, the effectiveness of national pharmacovigilance frameworks is probably not going to enhance, which may bargain patient safety.

Keywords: Pharmacovigilance, ADRs, Hospitalization, Clinical research, Patient safety.

Introduction

Pharmacovigilance in India was initiated way back in 1986 with a formal adverse drug reaction (ADR) monitoring system, under supervision of the drug controller of India. India joined the World Health Organization (WHO) Programme for International Drug Monitoring in 1998, but was not successful. Later, the National Programme of

Pharmacovigilance was launched in 2005, and was renamed as the Pharmacovigilance Programme of India (PvPI) in 2010. In consideration of having a robust pharmacovigilance system in India, steps were taken. The National Coordination Centre was shifted from New Delhi to the Indian Pharmacopoeia Commission (IPC) in Ghaziabad. The PvPI works to safeguard the health of the

Indian population by ensuring that the benefit of medicines outweighs the risks associated with their use. The culture of reporting of ADRs has achieved remarkable success, with 250 PvPI-established adverse drug monitoring centres all over India and provision of training to healthcare professionals. The programme is striving hard to build trust between the physician and the patient, thereby increasing patient safety and the confidence of people in the country's health system, in addition to the detection of substandard medicines and prescribing, dispensing and administration errors. The IPC-PvPI has now become a WHO Collaborating Centre for Pharmacovigilance in Public Health Programmes and Regulatory Services. In spite of these achievements, several challenges are faced by the PvPI, like the monitoring of generic drugs, biosimilars, and disease-specific ADRs of antidiabetic, cardiovascular and antipsychotic drugs and, above all, creating awareness, which is a continual process¹⁻³. At the same time, the PvPI is trying to address other challenges like counterfeit drugs, antimicrobial resistance, and surveillance during mass vaccinations and other national programmes. India has a vast genetic and ethnic variability with different disease prevalence. Numerous Pharmaceutical products are available in the market to prevent or control the several disease conditions. Currently, new drugs are being introduced into the market like vaccines, high tech pharma products. Drugs which were commercial and continue to be available in the Indian market were banned for their proven adverse effects. Even some medications are still using due to the benefits outweighs its risks. The burden of adverse drug reactions in the global scenario is high and it results in morbidity, mortality and extra-cost to the public.

Adverse drug reaction simplify that any causal relationship between the drug and the event is suspected/this implies that there is a suspected relatedness to the administered drug. Off-label use, OTC drug use (India ranks 11th position in the global for OTC drug use), drug misuse, drug overuse, medication error includes prescribing error, dispensing error, administration error and drug abuse are also tend to cause adverse drug reaction.

Types of Adverse Drug Reaction⁴⁻¹⁴

Type-A (Augmented): Commonest (up to 70%), Dose dependent, severity increases with the dose. It can be preventable in the most part by slow administration and lower the dose. Predictable by the pharmacological mechanisms, e.g., Insulin induces hypoglycemia, hypotension by beta-blockers, and NSAIDs induced gastric ulcers.

Type-B (Bizarre): serious, rare, unpredictable, idiosyncratic, genetically determined, mechanisms are unknown, unrelated to the dose and it could be fatal; e.g., aplastic anaemia caused by Chloramphenicol, Anaesthetics

induced neuroleptic malignant syndrome and antipsychotics and hepatitis caused by halothane.

Type-C (Continuous drug use): Occurs as a result of continuous drug use, maybe irreversible, unexpected, unpredictable, e.g., tardive dyskinesias due to Antipsychotics, Anticholinergic medications dementia.

Type-D (Delayed): Delayed occurrence of ADRs, even after the cessation of treatment, e.g., ophthalmopathy after Chloroquine, corneal opacities after Thioridazine and pulmonary/peritoneal fibrosis after Methyserzide.

Type-E (End of dose): Withdrawal reactions e.g., hypertension and restlessness caused by Opiate abstainer, seizures on alcohol or benzodiazepines withdrawal, Alpha-blockers (Prazosin) or ACE inhibitors induced hypotension.

Type-F (Failure of therapy): Results from the inadequate treatment e.g., accelerated hypertension because of inefficient control.

Adverse drug reactions are so high due to the high number of drugs prescribed (polypharmacy), the ever increasing number of new drugs in the market, irrational use of drugs and the lacking of a formal system for monitoring adverse drug reactions.

Adverse drug reaction could be serious or non-serious. Serious adverse drug reaction includes death, life-threatening, patient hospitalization or prolongation of existing hospitalization, significant disability and congenital anomaly or birth defect. Monitoring of medicines is an integral part of clinical practice.

Challenges of Adverse Drug Reaction Reporting System in India

Inadequate knowledge regarding the drugs and process of adverse drug reaction includes what to report, how to report and where to report, inability link to the ADR with the drug, confident, communication skills, awareness about PV programme, time, connectivity, financial incentives, legal aspects, apprehension that the serious ADRs are already documented when a drug is introduced in to the market, that a single report would make no difference and ignorance.

Process for Reporting Adverse Drug Reaction in India

Use of multi-modal practices, poor patient compliance are the factor also requires ADRs monitoring and reporting. Pharmacovigilance is becoming increasingly important due to the potentially harmful effects of drugs on patient's health. The awareness regarding ADRs monitoring and reporting is steadily increasing in India.

Aim of the Pharmacovigilance includes detection, monitoring and reporting of adverse drug reaction includes severe either non severe and expected or unexpected mainly for the post-marketing drugs, it is essential to identify the risk factor which leads to development of adverse drug reactions. Types of adverse drug reactions are assisting to detecting the incidence and prevalence of adverse drug reactions or by using WHO scale/Naranjo scale.

Currently India has been planning to estimate the pharmaco-economic data related to ADRs, example., what extent ADRs are related to cause hospital admissions, prolonged hospital stay, total cost (direct or indirect) involved in the management of ADRs and cost that is incurred by the hospital and the nation also, total extent of morbidity and mortality due to adverse drug reactions. Later do the systematic analysis to obtain data and these are circulate to the health agencies, regulatory authorities, pharmaceutical companies, physicians, Pharmacist and other health care professionals (e.g. Nurses, dentists, and paramedics, etc.), so that the safety of drugs and modification of the prescribing patterns can be ensured¹⁵⁻²⁰.

Government of India initiated a Pharmacovigilance Programme of India (PvPI) for Assuring Drug Safety, under Central Drugs Standard Control Organisation (CDSCO). New Delhi has initiated a countrywide pharmacovigilance programme under the agency of Ministry of Health & Family Welfare. Government of India also maintain liaison with international Pharmacovigilance regulatory authority and review Periodic safety unit report (PSUR) of pharmaceutical analysis. The PvPI programme is coordinated by the Indian Pharmacopoeia Commission (IPC) which is located at Ghaziabad to publish official documents, by adding new and updating existing monographs in the form of Indian Pharmacopoeia which results in improving quality of medicine.

In 2008 Pharmacy council of India (PCI) introduced Doctor of Pharmacy (Pharm D) programme, Clinical pharmacists are mainly determined in clinical oriented activities such as drug interaction monitoring, adverse drug monitoring and reporting, prescription analysis/ auditing and patient counseling for better pharmaceutical care by reducing therapeutic failure results in patient safety. In India one hundred and seventy nine adverse drug reactions (ADRs) monitoring centers were reported ADRs to NCC operating under the supervision of Steering Committee, which is under PvPI. Recommend procedures and guidelines for regulatory interventions are taken by India. It builds capacity to monitoring, surveillance collaboration with national health programme and WHO international drug monitoring programme. Healthcare professionals or patient

can directly report to regional ADR monitoring centre later collected by IPC. Presently, PvPI established seven new district-level AMCs in eastern Uttar Pradesh, all aimed at generating omnibus data on safety of medicine at the grassroot level.

Recent studies shows in Raipur, India during one year total 232 individual case safety reports were (ICSRs) reported to Vigiflow 63.79% was found to be non-serious and 36.21% was serious. Since 1998 PCI also the member of Uppsala monitoring centre. Hemovigilance launched in 10/Dec/2012 as an integral part of PvPI to track ADR/events and incidence associated with blood transfusion and blood product administration. It also refers to identifying trend and recommends best practice. Intervention requires improving patient care and safety while reducing the overall cost of health care system.

Minimum valid criteria to ADR report includes, patient identifier, e.g., initials, age or date of birth, gender, reporter details (name, profession, institution, contact details), name of suspected medicinal product (s) include drug name (brand or generic name), manufacturer, batch no/lot no, expiry date, dose used, route used, frequency, dates of therapy started and stopped, and indication of use, report de-challenge (drug withdrawn) and re-challenge (re administered of drug after adverse drug reaction) and details of the suspected adverse drug reaction.

Report form also contain concomitant medication (drugs which are used or given at the same time as suspected drug), outcome of the events (recovered, not recovered or recovering). Doctors (Interns, House officers), nurses, pharmacist and residents also need to be more actively involved in reporting ADRs. all types of suspected ADRs irrespective of whether they are known or unknown, serious or non serious and solicited (clinical study) or unsolicited (spontaneous). In addition, the reporting ADRs due to lacking of efficacy, overdose, antibiotic resistance and suspected pharmaceutical defects (spurious and adulterated drugs) is recommended.

Need of Pharmacovigilance Centers in the Hospitals Establishing the Culture of Adverse Drug Reaction Reporting

Currently, 179 Medical Council of India approved teaching hospitals and corporate hospitals have been identified as ADRs Monitoring Centers (AMCs) across the country. These centers are covered in four zonal offices of Central Drugs Standard Control Organization (CDSCO) for administrative and logistic purpose. These AMCs are connected with international networking (reporting through VigiFlow; WHO-Uppsala Monitoring Centre [UMC] software). These AMCs report ADRs to NCC through VigiFlow, the software owned by WHO-UMC, (Sweden).

The reluctance in reporting is now changing as the PvPI has launched a complete roadmap for a proactive pharmacovigilance system which increases the awareness about the benefits of ADRs reporting. Over 5 years, the NCC has played a significant role in creating awareness among healthcare professionals about reporting ADRs that saw more than 1,49,000 ADRs reported till December 2015 [Figure 1]. Currently, the contribution of India to the WHO global Individual Case Safety Reports (ICSRs) database is 3%. The healthcare professionals are encouraged to report through feedback and Newsletters.

Integration of Pharmacovigilance Programme of India and National Aids Control Organization

India has the third largest number of people living with HIV in the world, 2.1 million at the end of 2013 and accounts for about 4 out of 10 people living with HIV in the region, in India, the numbers of new HIV infections declined by 19%, yet it still accounted for 38% of all new HIV infections in the region. India recorded a 38% decline in AIDS-related deaths between 2005 and 2013. During this period, there was a major scale-up of access to HIV treatment. At the end of 2013, more than 700,000 people were on antiretroviral therapy (ART), the second largest number of people on treatment in any single country. During last 5 years, there were 11 ART fixed drug combination were approved for manufacturing in India. To ensure the safety of antiretroviral (ARV) medicines used in the program, IPC, NCC-PvPI, and National AIDS Control Organization formally agreed to collaborate on September 15, 2014, for setting up systems and processes for reporting, analysis, and monitoring of ADRs due to ARV medicines used in NACP.

Collaboration with Adverse Events Following Immunization

NCC-PvPI is assisting with adverse events following immunization (AEFI) at Immunization Technical Support Unit (ITSU) which has been set up by MoHFW with Public Health Foundation of India to ensure the vaccine safety. AEFI cases which are reported to NCC are shared with ITSU on regular basis for further necessary action. To bridge the gap among PvPI, AEFI, CDSCO, and other stakeholders NCC published an exclusive issue of "PvPI Newsletter (volume 3; issue 5 2013)." The NCC officials/coordinators at AMCs participated in all AEFI workshops.

Collaborations with Central Drugs Standard Control Organization

ADR monitoring and reporting to national regulatory authority are put in place in many countries. In India, PvPI is closely working with CDSCO, drug regulatory authority of India. CDSCO understands that pharmacovigilance plays a specialized and pivotal role in ensuring ongoing safety of medicinal products in India and it seeks inputs from NCC

before taking any kind of regulatory decisions. NCC-PvPI is working in close coordination with CDSCO zonal offices also for technical, administrative, and logistics matters related to PvPI.

Education and Training on Pharmacovigilance at Regional Training Centers

A primary objective of NCC-PvPI is to promote the safest use of medicines through contributing to appropriate education in pharmacovigilance and training activities across the country. The NCC identified nine Regional Training Centers (RTCs) such as JSS Medical College, Mysore; Seth GS Medical College and KEM Hospital, Mumbai; Postgraduate Institute of Medical Education and Research, Chandigarh; Institute of Post Graduate Medical Education and Research, Kolkata; All India Institute of Medical Sciences, Bhopal; B. J. Medical College, Ahmedabad; Silchar Medical College and Hospital; All India Institute of Medical Sciences, Rishikesh; and Nizam's Institute of Medical Sciences, Hyderabad. These centers provide continual training to the personnel at AMC of their respective regions.

PV was officially introduced in December 1961 with the publication of a letter in *The Lancet* by Dr. William McBride, the Australian obstetrician who first suspected a causal link between serious fatal deformities (phocomelia), thalidomide used during pregnancy: Thalidomide was used as an anti-emetic and sedative agent in pregnant women. In 1968, the WHO promoted the 'Programme for International Drug Monitoring' a pilot project aimed to centralize world data on Adverse Drug Reactions (ADRs). In particular, the main aim of the "WHO Programme" was to identify the earliest possible PV signals. The term PV was proposed in the mid-70s by a French group of pharmacologists and toxicologists to define the activities promoting 'The assessment of the risks of side effects potentially associated with drug treatment'. WHO defines PV as 'the pharmacological science relating to the detection, assessment, understanding and prevention of ADRs, particularly long-term and short-term ADRs of medicines. PV serves various roles such as identification, quantification and documentation of drug-related problems which are responsible for drug-related injuries'²¹⁻²².

The recognized ADRs, to identify unrecognized ADRs, to evaluate the effectiveness of medicines in real-world situations, and to decrease mortality and morbidity associated with ADRs. The UMC located at Uppsala, Sweden co-ordinates the International Drug Monitoring program (IDM). Till now there are 104 official member countries and 33 associate members throughout the world, including developed, developing and under-developed countries. India is the world's second most populated country with over one billion potential drug consumers. Although, India is participating in the UMC program, its

contribution to this database is relatively small. This problem is essentially due to the absence of robust ADRs monitoring system and also the lack of awareness of reporting concepts among Indian health care professionals. It is very important to focus the attention of the medical community on the importance of ADRs to ensure maximum benefits for public health and safety. In India ADRs are considered among the leading cause of morbidity and mortality. Approximately 8% of hospital admissions are estimated due to ADRs and regarding 8-19% of hospitalized patients experience a serious ADR. When the FDA approves a new drug or marketing, its complete adverse events profile may not be known because of the limitation of pre-approval clinical trials. Typically, clinical trials for new drugs are not of short durations and are conducted in populations that number up to 5000, therefore, the most common dose related ADRs are usually detected in the premarketing phase while ADRs which are rare and those detected on long term use.

Pharmacovigilance Programme of India (PvPI) A National PV Centre is located in the Department of Pharmacology, All India Institute of Medical Sciences (AIIMS), New Delhi and two WHO special centres are located in Mumbai (KEM Hospital) and Aligarh (JLN Hospital). These centres were to report ADRs to the drug regulatory authority of India. The major role of these centres was to monitor ADRs to medicines marketed in India. The Central Drugs Standard Control Organization (CDSCO), Directorate General of Health Services under the aegis of Ministry of Health & Family Welfare, Government of India in collaboration with Indian Pharmacopoeia Commission (IPC), Ghaziabad, (U.P.) is initiating a nation-wide PV programme for protecting the health of the patients by assuring drug safety. The programme shall be coordinated by the IPC as a National Coordinating Centre (NCC). The centre will operate under the supervision of a Steering Committee. The PvPI was initiated by the Government of India on 14 July 2010 with the AIIMS, New Delhi as the NCC for monitoring ADRs in the country for safeguarding Public Health. In the year 2010, 22 ADRs monitoring centres including the All India Institute of Medical Sciences (AIIMS) New Delhi, were set up under this programme. To ensure implementation of this programme in a more effective way, the NCC was shifted from the AIIMS, to the IPC on 15 April 2011. International Collaboration The following organizations play a key collaborative role in the global oversight of PV. The World Health Organization The principle of international collaboration in the field of PV is the basis for the WHO Programme for IDM, through which over 150 member nations have systems in place that encourage healthcare personnel to record ADRs of drugs in their patients. These reports are assessed locally and may lead to action within

the country. Since 1978, the programme has been managed by the UMC to which member countries send their reports to be processed, evaluated and entered into an international database called Vigi-Base. Membership in the WHO Programme enables a country to know if similar reports are being made elsewhere. The International Council for Harmonisation (ICH) ICH is a global organization with members from the European Union, the United States and Japan; its goal is to recommend global standards for drug companies and drug regulatory authorities around the world, with the ICH Steering Committee (SC) overseeing harmonization activities.

Drug safety and pharmacovigilance remains a dynamic clinical and scientific discipline. Pharmacovigilance is defined by the World Health Organization (WHO) as 'the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other drug-related problem'; it plays a vital role in ensuring that doctors, together with the patient, have enough information to make a decision when it comes to choosing a drug for treatment. However, despite all their benefits, evidence continues to get those bigger adverse reactions to medicines which are common, yet often preventable, cause of illness, disability and even death. In some countries, adverse drug reactions (ADRs) rank among the top 10 leading causes of mortality. In order to prevent or to reduce harm to patients and thus improve public health, mechanisms for evaluating and monitoring the safety of medicines in clinical use are vital. Pharmacovigilance programs in the next 10 years, describe in brief the potential implications of such trends on the evolution of the science. These days pharmacovigilance is facing lots of challenges to develop better health care systems in this global pitch. Major challenges are globalization, web-based sales and information, broader safety concerns, public health versus pharmaceutical industry economic growth, monitoring of established products, developing and emerging countries, attitudes and perceptions to benefit and harm, outcomes and impact.

Historical perspectives of WHO - drug safety monitoring

In 2002, more than 65 countries have their own pharmacovigilance centers. Membership of the WHO for International Drug Monitoring is coordinated by the WHO Collaborating Centre for International Drug Monitoring, known as the Uppsala Monitoring Centre (UMC). Pharmacovigilance is now firmly based on sound scientific principles and is integral to effective clinical practice. The discipline needs to develop further to meet public expectations and the demands of modern public health. The Sixteenth World Health Assembly adopted a resolution that reaffirmed the need for early action in regard to rapid dissemination of information on adverse drug reactions and led later to creation of the WHO Pilot Research Project for

International Drug Monitoring. The purpose of this was to develop a system, applicable internationally, for detecting previously unknown or poorly understood adverse effects of medicines²³⁻²⁵.

Global status of Pharmacovigilance

A complex and vital relationship exists between wide ranges of partners in the practice of drug safety monitoring. These partners must jointly anticipate, understand and respond to the continually increasing demands and expectations of the public, health administrators, policy officials, politicians and health professionals.

The Quality Assurance and Safety: The team is a part of the Department of Essential Drugs and Medicines Policy, within the WHO Health Technology and Pharmaceuticals cluster. The purpose of the department is to help save lives and improve health by closing the huge gap between the potential that essential drugs have to offer and the reality that for millions of people, particularly the poor and disadvantaged, medicines are unavailable, unaffordable, unsafe or improperly used.

The Uppsala Monitoring Centre: The principal function of the Uppsala Monitoring Centre is to manage the international database of ADR reports received from National Centers. The UMC has established standardized reporting by all National Centers and has facilitated communication between countries to promote rapid identification of signals.

The National Pharmacovigilance Centers: National Centers have played a significant role in increasing public awareness of drug safety. This development is partly attributable to the fact that many national and regional centers are housed within hospitals, medical schools or poison and drug information centers, rather than within the confines of a drug regulatory authority. Major centers in developed countries have established active surveillance programmes using record linkage and prescription event monitoring systems (PEM) to collect epidemiological information on adverse reactions to specific drugs. Such systems have already been implemented in New Zealand, the United Kingdom, Sweden and the United States of America. The entire cost of a pharmacovigilance system, compared with the national expenditure on medicines or the cost of ADRs to the nation is very small indeed.

Hospitals and Academia: A number of medical institutions have developed adverse reaction and medication error close watch systems in their clinics, wards and emergency rooms. Case-control studies and other pharmacoepidemiological methods have increasingly been used to estimate the harm associated with medicines once they have been marketed. Academic centers of pharmacology and pharmacy have played an important role

through teaching, training, research, policy development, clinical research, ethics committees (institutional review boards) and the clinical services they provide.

Health Professionals: Originally physicians were the only professionals invited to report as judging whether disease or medicine causes a certain symptom by exercising the skill of differential diagnosis. Today, different categories of health professionals will observe different kinds of drug related problems.

Patients: Only a patient knows the actual benefit and harm of a medicine taken. Direct patient participation in the reporting of drug related problems will increase the efficiency of the pharmacovigilance system and compensate for some of the shortcomings of systems based on reports from health professionals only.

Pharmacovigilance in drug regulation

Pharmacovigilance programs made strong by links with regulators. Regulators understand that pharmacovigilance plays a specialized and pivotal role in ensuring ongoing safety of medicinal products.

Clinical trial regulation: In recent years there has been a substantial increase in the number of clinical trials in developed and developing countries. In their approval of clinical trials, regulatory bodies look at safety and efficacy of new products under investigation. Safety monitoring of medicines in common use should be an integral part of clinical practice. Education and training of health professionals in medicine safety, exchange of information between national pharmacovigilance centers, the coordination of such exchange, and the linking of clinical experience of medicine safety with research and health policy, all serve to enhance effective patient care. A regular flow and exchange of information in this way means that national pharmacovigilance programmes are ideally placed to identify gaps in our understanding of medicine-induced diseases.

Post marketing safety drug monitoring: These includes detection of drug interactions, measuring the environmental burden of medicines used in large populations, assessing the contribution of 'inactive' ingredients to the safety profile, systems for comparing safety profiles of similar medicines, surveillance of the adverse effects on human health of drug residues in animals, e.g. antibiotics and hormones. The Council for International Organizations of Medical Sciences (CIOMS) report on benefit-risk assessment of medicines after marketing has contributed to a more systematic approach to determining the merit of available medicines.

Pharmacovigilance in national drug Policy: The provision of good quality, safe and effective medicines and

their appropriate use is the responsibility of national governments. Multidisciplinary collaboration is of great importance in particular, links need to be forged between various departments of the ministry of health and also with other stakeholders, such as the pharmaceutical industry, universities, nongovernmental organizations (NGOs) and those professional associations having responsibility for education on rational use of medicines and pharmacotherapy monitoring.

Pharmacovigilance in Disease Control Public Health Programmes: The monitoring of medicine safety in countries where there is no regulatory or safety monitoring system in place, or in remote areas with little or no health care surveillance or infrastructure, has been identified as a matter for concern. The problems are especially apparent in situations that involve the use of medicines in specific communities, for example, for the treatment of tropical diseases such as malaria, leishmaniasis and schistosomiasis, and for the treatment of HIV/AIDS and tuberculosis. Pharmacovigilance should be a priority for every country with a public health disease control programs²⁶⁻²⁷.

The current global network of pharmacovigilance centers is coordinated by the Uppsala Monitoring Centre, would be strengthened by an independent system of review. This would consider contentious and important drug safety issues that have the potential to affect public health adversely beyond national boundaries. The Erice Declaration provides a framework of values and practice for collection, analysis and subsequent communication of drug safety issues. Today, the burden of ADRs on public health despite the progress in pharmacovigilance that has been made, the burden on public health of ADRs remains significant. Pharmacoeconomic studies on the costs of adverse reactions suggest that governments pay considerable amounts from health budgets towards covering costs associated with them. However, it has become increasingly clear that the safety profile of medicines is directly linked with socio-political, economic and cultural factors that in turn affect access to medicines, their utilization patterns and public perceptions of them.

Drug utilization: Drug utilization patterns are a major determinant in drug safety. For instance, the use of injectable medicines is more common in developing countries. Direct advertizing to the consumer of prescription medicines has become commonplace in many countries. With this information patients feel more able to make their own therapeutic decisions, without assistance from doctor or pharmacist. The result has been increasing self medication, licit and illicit sale of medicines over the Internet, and over-prescribing by doctors on patients' demand. This has had considerable effect on increased prescribing. Such public health programmes, however,

need not focus only on patients but could be used for the benefit of the general public as well. Such awareness-building and educational initiatives should also include children and elderly populations and could be greatly facilitated through partnerships with the media, educational institutions, governmental and non-governmental organizations. The success of WHO International Drug Monitoring Programmes is entirely dependent on the contributions of national pharmacovigilance centers. Ideally every country should have a pharmacovigilancecentre.

International response to drug safety issues

Certain safety issues are likely to have a global impact with possibly serious consequences for public health. When this happens, a cohesive international assessment and response is needed. The WHO has supported the creation of an independent advisory panel composed of a broad spectrum of medical disciplines including clinical pharmacologists, regulators, academics and epidemiologists. The functions of this panel will be to provide advice to WHO on safety issues relating to medicinal products, including its Collaborating Centre for International Drug Monitoring and through it to the Member States of WHO.

The benefit and risk balance of the pandemic vaccines and antiviral used for the current H1N1 influenza pandemic continues to be positive. To date, no unexpected serious safety issues have been identified. The most frequent adverse reactions that have been reported are non-serious and as expected. The EMEA issued a press release on November 2009 reaffirming the efficacy and safety of the centrally authorized vaccines. With vaccination campaigns ongoing in the European Union, it is estimated that about 10 million people have been vaccinated so far. The vaccine adverse effects reported so far have mainly been symptoms such as fever, nausea, headache, allergic reactions and injection site reactions, confirming the expected safety profile of the three vaccines. New clinical trial data showed greater incidence of fever following the second dose of Pandemrix in infants from 6 months to 35 months. An assessment of these data is ongoing.

Role of clinicians in pharmacovigilance²⁸

Clinicians play a crucial role in preventing ADRs by recognizing, managing, and reporting ADRs to the national pharmacovigilance centers (NPCs). Safe and rational prescription of drugs require therapeutic reasoning and appropriate selection of drugs for each patient. Factors that may increase the risk of ADRs include age, medication error, polypharmacy, and patient-specific risk factors, such as comorbidities.

Recognizing ADRs and differentiating them from other diseases or comorbidities is challenging and requires the

clinicians to have knowledge of the clinical pharmacological principles of ADRs, including their types, dose-relatedness, hypersensitivity reactions, time relationships, and risk factors. For example, long-term complications, such as atypical femoral fractures secondary to bisphosphonates, may only occur after prolonged exposure.

The Future Challenges of pharmacovigilance²⁹⁻³⁰

Some of the serious challenges facing pharmacovigilance programmes in the next ten years, describing in brief the potential implications of such trends on the evolution of the science.

Some key points for future consideration which may be improved to make better pharmacovigilance practice:

Pharmacovigilance should be less focused on finding harm and more on extending knowledge of safety. Complex risk-benefit decisions are amenable to, and likely to be improved by, the use of formal decision analysis. Pharmacovigilance should operate in a culture of scientific development. This requires the right balance of inputs from various disciplines, a stronger academic base, and greater availability of basic training, and resource which is dedicated to scientific strategy. Systematic audit of pharmacovigilance processes and outcomes should be developed and implemented based on agreed standards.

Conclusion

A strengthening and commitment of network pharmacists to patient record check and electronic announcing may likewise lessen ADR related occasions. Without successful distinguishing proof and satisfaction of preparing needs of pharmacists and other medicinal services experts, the effectiveness of national pharmacovigilance frameworks is probably not going to enhance, which may bargain patient safety. To meet this objective, administrative bodies should make enactments to rouse pharmacists to be effectively engaged with the framework. Other than their dynamic cooperation, their allotted job ought to have a more extensive range to acquire the greatest help dependent on their aptitude. Compelling utilization of pharmacists' workforce will enhance the result of the pharmacotherapy and in addition decline worldwide wellbeing costs. The job of pharmacists in pharmacovigilance frameworks is expanded under Affordable Care Act or the present social insurance change, since individuals who generally had no protection, presently meet all requirements for protection; and this could build the case for drug store administrations. The Pharmacovigilance framework usage is the need which is conceivable by joint effort between the scholarly world, human services suppliers including pharmacist, patient, maker, government, media and common society, UMC Sweden working under (WHO), FDA, ISOP and other

worldwide association taking a shot at medication safety and lowers the drug problems in the clinical practice.

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