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Medication errors in patients and their effects on the quality of medical care

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ABSTRACT :*A medication error (ME) is defined as any avoidable event in which the dose of medication received by the patient differs from that prescribed or established by the hospital's policies and procedures. ME are a latent problem and must first be recognized in order to be treated and eradicated since both patient and medical unit are seriously affected. The objective of this work is to review ME and expose the problems that affect the quality of medical care. A systematic review was made in bibliographic databases (PubMed / MEDLINE, Science), and through the internet manually in public journals and information documented by the World Health Organization, Federal Commission for the protection against Health Risks (COFEPRIS), National Pharmacovigilance Center (CNFV) and a systematic review. The EM as acts or intentions, cause negative consequences that affect the quality of health of the patient, so it is necessary to ensure the safety of the use of pharmacological therapies, with the help of medical care protocols, prescription manuals, and the help of teamwork of all members of health as the pharmacist, doctor (MD), nurse and nutriologist.*

Keywords: *Medication errors,patient's health, pharmacist, pharmacological therapies*

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I. Introduction

In this bibliographic short review, a summary of the medication errors (EM) is made and also the current problems that affect the health care centers are exposed. The EM have negative actions first in the recovery of the patient who comes to the centers to correct a health condition, not only affect the patient, but also the entire health system, on the other hand the quality of care decreases as the patient will possibly require an extension of the stay in the medical center, or perhaps suffer some negative interaction for the wrong medication, another possible scenario is the unchaining of a chronic condition and in the worst case the death of the patient.

From the administrative point of view, a medication error affects the economy of the health center or hospital, by prolonging the stay of patient and the recoverycosts increase, and there is the possibility of substantial demands on the part of the affected party.

Medication errors are a latent problem and must first be recognized in order to be treated and eradicated since both patient and medical unit are seriously affected.

II. Pharmacovigilance.

According to the draft Official Mexican Standard PROY-NOM-220-SSA1-2015, Installation and operation of pharmacovigilance, a drug is any substance or mixture of substances of natural or synthetic origin that has a preventive or rehabilitative therapeutic effect, that is present in pharmaceutical form and is identified as such due to its pharmacological activity, physical, chemical and biological characteristics. When a product contains numerous nutrients, it will be considered as a medication as long as it is a preparation that contains individually or associated vitamins, minerals, electrolytes, amino acids or fatty acids, in concentrations higher than those of natural foods and is also present in some defined pharmaceutical form and the indication of its use contemplates therapeutic, preventive or rehabilitative effects. As established in article 221, section I of the General Health Law. [1]

Now, it is important to point out and emphasize that the pharmacist plays a fundamental role within the interdisciplinary team that serves the patient in primary and specialized care, because he is the member of the

health team specialized in the management of medications. In hospitals, pharmacists have the availability to monitor the effect that drug treatment has on the patient and to completely analyze the process of administration of medications in order to identify so-called medication errors [2].

III. Pharmacotherapy Safety

It is necessary mentioning that the rational use of medicines contributes significantly to the well-being of the individual and therefore, of society. However, this is not an easy situation to achieve and maintain. Experience has shown that, on the way between the prescription, the dispensing and the final use of the drug by the patient, sometimes problems arise that lead to an incorrect use of the drug or to the appearance of undesired effects. This generates inconveniences for the patient who does not find an answer to his health problem and also for the health system whose expenses are increased. The role of pharmacists in the detection, prevention and resolution of these, as well as the need for their relationship with the health team, especially with physicians, should be highlighted to guarantee patients pharmacotherapy safety [3].

Likewise, the central objective of the use of medications is to achieve therapeutic, preventive or diagnostic effectiveness, for which they have been designed, improving the quality of life of the patient and minimizing the risks inherent to their use; however, this goal is not always achievable. When talking about medication errors it seems that a low frequency, uncertain and that should be covered up phenomenon is described; the reality is that it is a global public health problem. The magnitude and impact of this problem has been estimated in countries such as the United States, at the end of the nineties: at least 7,000 deaths per year associated with problems with medications and a cost close to two billion dollars for preventable events. These figures placed errors in the medical care process between the fourth and sixth causes of mortality, even above breast cancer, traffic accidents and AIDS. [4]

To better understand this health problem, it is important to mention that there is a branch of pharmacologysciencie responsible for analyzing this situation. Pharmacoepidemiology is the study of the use and effects of drugs in large populations, directed on the one hand to the scope of pharmacovigilance and on the other to the Studies on the Use of Drugs. Recently, other areas related to medicines have become relevant, such as pharmacoeconomics or measures of quality of life related to health, which the field of pharmacoepidemiology. [5]

¿What is the error? Some authors consider that the term "error" is negative and perpetuates the culture of blaming, in addition to evoking feelings of guilt, anger and depression. Today the word "incident" is used indistinctly, which is a failure in the decision making that can cause or that causes an adverse event; this is an injury caused by medical management and not by underlying conditions of the patient. In turn, an adverse event attributable to an error is a preventable adverse event, and a negligent adverse event is a preventable adverse event that meets the legal criteria for determining negligence. [6] In 1999 the American Society of Medicine issued report "To error is human, building a safe healthcare system", and since then patient safety has been a priority for health authorities. [7]

And then ¿what is a medication error? It is any avoidable event that leads to an inappropriate use of medicines and that may be related to professional practice, derived from wrong or unsubstantiated actions, which can affect health and that goes from the moment of prescription to compliance of the medical order. A fault in the prescription can range from the inappropriate choice of the drug, its dose, the route of administration, the duration of the treatment and its frequency, until the inappropriate or erroneous prescription according to the individual characteristics of each patient or of the coexisting therapies. , and may even depend on an inadequate evaluation of the potential harm derived from a given treatment [8].

The risk of health care in general, especially that caused by medication errors, is a serious problem with great human, healthcare and economic impact, which is being addressed as a priority by the health authorities of some countries. [9]

Medication errors Medication errors are multifactorial and multidisciplinary [10] are produced by failures in the processes of medication use and should be analyzed as system errors. They should never be considered as human errors and assign responsibilities, but analyze their causes to prevent errors from recurring. The ultimate goal should be to improve working procedures to prevent them from happening again. [11]

According to the Supplement for Establishments Dedicated to the Sale and Supply of Medicines and Other Inputs for Health, a medication error is any preventable incident that can cause harm to the patient or lead to an inappropriate use of medications, when they are under the control of health professionals or of the patient or consumer. These incidents may be related to professional practice, products, procedures or systems, including failures in prescription, communication labeling, packaging, preparation, dispensing, distribution, administration, education, monitoring and use. [12].

IV. Medication Errors

As mentioned above, in hospitals, pharmacists have the availability not only to monitor the effect that drug treatment has on the patient, but also to completely analyze the medication administration process (Fig 1) in order to identify the errors that occur in this, the so-called medication errors. [2]

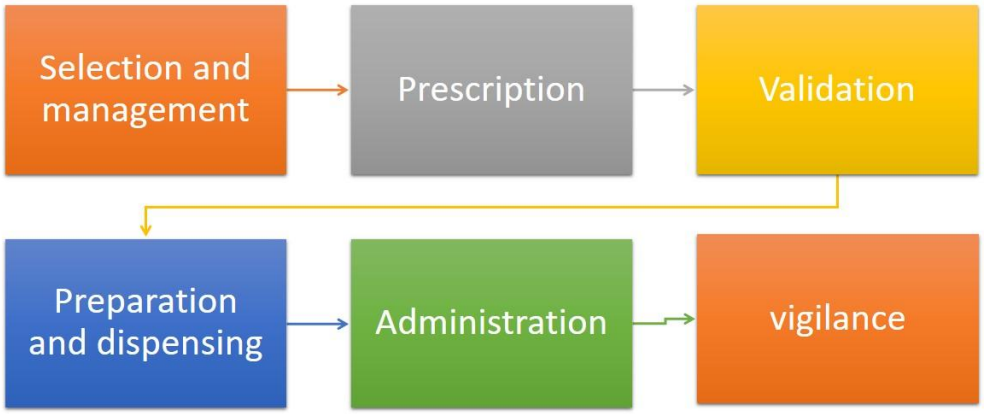

Figure 1. Process of medication administration
(Del Rey-Pineda & Estrada-Hernández, 2014).

Adverse events related to medications can lead to important health problems of the patient, with relevant economic and social repercussions. Among them, medication errors are common occurrences and can assume clinically significant dimensions and impose significant costs on the health system [13]. It should not be forgotten that the process of use and management of medicines comprises a series of complex steps, ranging from the selection and availability of the medicine in the health institution, to the education of the patient or their caregiver, combined with the interaction of different health professionals. Therefore, it is understandable that the causes most frequently associated with these events are human factors, insufficient training, inadequate communication and systematic failures. [4]

The morbidity and even mortality derived from the clinical use of medications are high [14] The review of medical records shows that half of medication errors occur in processes related to the care transition and changes in the person responsible for the patient. The discrepancies that occur between the medications that the patient took before admission and the hospital prescription have been evidenced in several studies. Similarly, the vulnerability of patients at discharge is evidenced by data indicating that 12% of patients experience an adverse effect within 2 weeks after hospital discharge [15]

It is important to have information in relation to MS as it allows to evaluate the processes that present flaws or that predispose to the generation of errors to be able to carry out interventions that favor the culture of safety in the use of medicines [16]

Medication errors due to their magnitude and importance constitute a public health problem with a great economic impact, so important and serious are that in the United States of America (USA) it has been estimated that between 44 and 98 thousand patients die each year as a result of clinical errors, placing them as the seventh cause of death in that country. Some reports have shown that errors in prescription are mainly attributed to the lack of criteria to identify them, especially in young doctors with little experience, being these responsible for 4.2% to 82.0% of errors in the formulation in Italy. In Colombia there are some records that show that the most frequent errors in 2011 were those of dispensing the medication (with 3833 among 5984 reports, corresponding to 64.1% of the cases) followed by those of prescription (n = 1603 , 26.8%), of the transcription of the formula (n = 410, 6.9%), and of the administration (n = 138, 2.3%). Of all these, there were 10 cases that managed to cause some harm to the patient. [8]

In Guadalajara, Mexico, a study was conducted with 381 patients: 292 with rheumatoid arthritis, 57 with ankylosing spondylitis and 32 with Systemic Lupus Erythematosus. One hundred twenty-seven (33%) had Medication Errors (MS). Ninety-eight (77%) worsened in their condition due to ME. Forty percent of MS was due to patient decisions, 41% to the lack of medication availability that should have been provided by SS, and 18% to a medical decision not justified by primary care providers. Patients lost an average of 3 working days each month due to MS. The cost of MS is high. In the case analyzed, timely access to treatment represents a

lower cost for the system, but represents a significant loss of work days per month. The EM is a sign of a system failure. Interprofessional teamwork is necessary to perfect the system. [17]

The use of antineoplastic drugs usually has a certain degree of risk due to the very nature and mechanism of action of the mentioned drugs. One of the hallmarks of cancer cells is their uncontrolled cell division. The mass of cells resulting from this division is called neoplasia or tumor. One of the ways to treat cancer is through chemotherapy, the use of antitumor drugs. Some of these drugs stop cell division by inhibiting mitotic use. Unfortunately, these types of anticancer drugs also kill all rapidly dividing cells in the body and produce adverse effects such as nausea, diarrhea, hair loss and decreased resistance to diseases [20]

Although the prevalence of medication errors with antineoplastics, as with other categories of drugs, is not exactly known, but due to its inherent toxicity, errors with antineoplastic drugs are distinguished from those associated with other types of medications. [21] Medication errors in oncology can cause severe clinical problems due to low therapeutic rates and high toxicity of chemotherapeutic agents. [22]

"Chemotherapy medication error" means any potential or actual error, in which chemotherapy or adjuvant medication is prescribed, transcribed, prepared, dispensed or administered at a dose other than that appropriate for that patient, at an incorrect date, by an incorrect route and / or with an incorrect administration technique, including the vehicle, duration, speed, compatibility and stability in solution, the order of administration; it also includes the involuntary omission of some medication in the prescription or transcription, as well as the omission of important data for the verification of the medical order. [2.3]

The therapeutic dose is often dictated by the limit of toxicity acceptable to the patient, so that even small increases in the dose can have serious toxic consequences. In addition, antineoplastic drugs mistakenly administered at subtherapeutic doses may compromise the subsequent response to treatment by delaying effective treatment until the adverse effects are resolved and / or suspending or switching to a later line of treatment in the absence of response. [21]

When it comes to medication there are three types of errors: dose by excess, dose by default and misuse. [24]

Frequently the therapeutic dose is dictated by the limit of toxicity acceptable to the patient, with which even small increases in the dose can have serious toxic consequences. [25]

Among the causes that generate errors in the context of chemotherapy may be: the optimal dose of the cytostatic, associated with variable anthropometric and clinical parameters from one patient to another, and even within the same patient, variable from one cycle to another, by the toxicity of previous cycles; likewise, there is variability within the same diagnosis and for the same association of cytostatics depending on the periodicity of the administration (weekly, three-weekly, monthly, etc.) and, finally, variability in the dosage of the same drugs integrated in different schedules of chemotherapy, for different diagnoses. [26]

Another cause is when you start an error prevention program

With serious toxicity or death of the patient as consequences.

The most frequent causes of accidental death with cytostatics are related to one of the following factors:

• Substitution of one cytostatic agent for another due to imprecise designations in the prescriptions or errors in the preparation, with drugs whose similar denomination and appearance (cisplatin carboplatin, doxorubicin, vincristine)

• Dose increase due to incorrect interpretation of decimals.

• Increase of dose due to misinterpretation of a scheme, for example, confusion of the daily dose with the total dose of the cycle.

• Incorrect route (intrathecal administration of an intravenous preparation).

Default dose

The therapeutic response of many cytostatics is linked to the intensity of the dose administered. Thus we are depriving the patient of the opportunity of a potential improvement or cure of his illness. Even in the absence of response, the clinician may choose to suspend subsequent cycles or to move to a later line of treatment, which may be more toxic, less effective or more expensive.

Another way to dose by default is to omit a dose of a cytostatic during the cycle or omit it completely. This error is becoming more frequent due to the greater complexity of chemotherapy treatment schemes and requires greater vigilance on the part of all health personnel (doctor, pharmacist and nurse).

Misuse

Other medication errors are linked to an incorrect administration technique that can compromise. Also the therapeutic response or even lead to the appearance of toxic effects. In this group of errors we can also include those that refer to the omission or incorrect dosage of fluid therapy, hydration, antiemetics, hematopoietic growth factors or corticosteroids. [24]

Given the high toxicity of cytostatics, it is important to know the prevalence of medication errors since they can cause serious consequences in the response to the treatment of each patient. [2. 3]In a study published during 2004 in Madrid, Spain, by the pharmacy service in the preparation of cytostatics at the hospital on October 12th, it was found that: In the first period of the study, from December 2000 to November 2001, a total of 149 possible errors in the prescription of cytostatics for parenteral administration, of which 96 were confirmed as such, while in the following year in the period of December 2001 - November 2002 a total of 143 possible errors were detected, of which 87 were confirmed. In table I they are broken down by type, quantity and percentage compared to the total number of detected errors.

Table I. Type of error in the prescription of cytostatics detected in a cytostatic preparation area (December 2000 - November 2002)(Goñi MG, Zubizarreta MV, Rodríguez MG, Cascajares SC, Gómez ME, de Tejada AH 2004)

Type of error	First period number	% First phase	Second period number	% second phase
Omission of dose or medication	3	3.1	2	2.2
Dose greater than the correct	34	35.5	29	33.3
Less than the correct dose	23	24	18	20.6
Extra dose	2	2	3	3.5
Wrong administration route	4	4.2	6	7
Wrong administration frequency	1	1	2	2.3
Wrong patient	8	8.3	6	7
Treatment duration greater than the correct	8	8.3	10	11.4
Duration of treatment less than correct	7	7.3	8	9.2
Erroneous medication	6	6.3	3	3.5
Total	96	100	87	100

It is essential that the prescription of cytostatic prescription errors is not performed as an isolated work within specific objectives, but that this registration is permanent and extends to the detection of errors throughout the circuit of use of this type of medicine. [27]

V. Prevention

With the aim of mitigating the problems raised, various programs and institutions have been created at an international level that seek to promote the safe use of medicines, such as the Institute for Safe Medication Practices (ISMP), the World Alliance for Patient Safety of the World Organization of Health and the Institute for Healthcare Improvement, among others. Although the aforementioned efforts are projected at an international level, the implementation of pharmacovigilance, a science dedicated to the study of adverse reactions and other problems associated with drugs, within the health institutions allows to identify, analyze and understand the occurrence of medication errors, as well as establishing strategies for their prevention. [4]

In the hospital setting, it is necessary to establish a quality policy with clear strategies to ensure patient safety, monitoring each of the links in the chain of the pharmacotherapeutic process [28] that is, in the prescription, validation, preparation, the dispensing and administration of medications, as well as in the follow-up of the entire pharmacological treatment of the patient [29]

The recommendations issued to address the reduction of medication errors have been numerous; however, they converge in a group of safe practices for the use of medicines, where the following stand out: the identification of high-risk and confusion-prone drugs, safe labeling of medicines that allows for easy identification, operation of therapeutic committees, use of abbreviations standardized, computer-aided electronic prescribing and centralized unit dose preparation.

It is important to clarify that such strategies should focus on the analysis and correction of the system, not seeking the guilt of the individual, which helps to create a culture of security. As noted: "punishing or

separating the culprit will not modify the defects of the system" and even when this person or group of people no longer operate, the same mistakes may happen again because the risk continues. [4]

Pharmacoepidemiological studies are useful diagnostic tools to identify the needs in improving the quality of health services and in the prescription of medications. They are intended to justify the development of strategies and the implementation of health programs that can help correct poor aspects found throughout these studies. In 1988, WHO found a low distribution of pharmacists in underdeveloped countries and recommended that these countries initiate research protocols in hospital and community pharmacies to promote the rational use of medicines. Although some efforts have already been made in Mexico and pharmacoepidemiological studies have been conducted in hospitals in some federal states such as Hidalgo there is still a low probability of finding a pharmacist in any hospital, health care establishment or community pharmacy. [30]

VI. Conclusion

A Medication errors can be a big problem, however, they can be eradicated following the recommendations mentioned but an important point to understand is that this is the tip of the iceberg that has submerged the Mexican health system, hospitals increasingly saturated and health personnel with an increasing workload, is not a good combination that helps a lot to correct practices like these errors.

It is essential to make an in-depth analysis of all the problems that encompass the health system in Mexico and thus establish dynamics that help to make the service more efficient without leaving aside the recognition and respect for the work of all health personnel who work every day, from its trench and as far as possible, for better health and quality of life of the population.

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