

EVALUATION OF PHARMACOTHERAPY USED ON GERIATRIC POPULATION IN AN INSTITUTION OF SPECIAL REGIME WITH THE SCREENING TOOL OF OLDER PERSONS' POTENTIALLY INAPPROPRIATE PRESCRIPTIONS (STOPP) CRITERIA

EVALUACIÓN DE LA FARMACOTERAPIA EN POBLACIÓN GERIÁTRICA DE UNA INSTITUCIÓN DE RÉGIMEN ESPECIAL CON LOS CRITERIOS THE SCREENING TOOL OF OLDER PERSONS' POTENTIALLY INAPPROPRIATE PRESCRIPTIONS (STOPP).

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Recibido: Julio 05 de 2015. Aceptado: Mayo 27 de 2016.

ABSTRACT

Background: Geriatric patients represent a major challenge for appropriate prescription because they have significant changes in vital areas, multiple comorbidities among other things that encourage their fragility. In light of current evidence, the number of prescription errors increases with age and with the number of drugs USED, showing that people over 65 is at greater risk of medical error when more than 8 drugs are consumed. **Objectives:** To identify and describe the inappropriate medicines in elderly people in order to propose an institutional prescription guide based on the results of the application of the Screening Tool of Older Persons' Potentially Inappropriate Prescriptions (STOPP) assessment methodology. **Methods:** A cross-section observational study with a retrospective collection of information was carried out in order to identify the frequency of inappropriate prescriptions in 300 elderly patients that were over 65 years, with a consumption of more than 5 medications and applying the STOPP criteria. The study was made in a special regime medical institution, reviewing medical records and considering variables such as number of medications, indications, dosage, therapeutic duplication, interactions and contraindications, among others. **Results:** The principal diagnosis was hypertension (47%) followed by diabetes mellitus (10%) and other hypothyroidisms (4%). After applying the STOPP criteria to each of the medical records, it was found that 50.7% (152) of the studied population had at least one inappropriate prescription distributed as follows: 2 prescriptions had 4 STOPP criteria, 7 prescriptions had 3 STOPP criteria, 28 had 2 STOPP criteria and 115 had 1 STOPP criteria. **Conclusions:** It was found that half of the prescriptions have at least one inadequate prescribed criteria, being the most important the inappropriate use of not indicated drugs or without an indication. Finally, guidelines for the rational use of drugs in the elderly with every detail of this institution are proposed.

Keywords: Elderly, potentially inappropriate prescribing, polypharmacy, medication errors.

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RESUMEN

Antecedentes: Los pacientes geriátricos representan un reto importante para la prescripción apropiada porque tienen cambios significativos en sus funciones vitales y múltiples comorbilidades, entre otros, que los hacen frágiles. A la luz de la evidencia actual, el número de errores de prescripción aumenta con la edad y con el número de fármacos, demostrando que las personas mayores de 65 años tienen mayor riesgo de sufrir un error médico cuando se consumen más de 8 medicamentos. **Objetivos:** Identificar y describir los medicamentos inapropiados en adultos mayores con el fin de proponer una guía de prescripción institucional basada en los resultados de la aplicación de los criterios de evaluación de prescripción potencialmente inapropiados en adultos mayores (STOPP). **Métodos:** Se llevó a cabo un estudio observacional descriptivo de corte transversal, con recolección retrospectiva de información. Se cuantificó la frecuencia de prescripciones inadecuadas en 300 pacientes mayores de 65 años y con un consumo de más de 5 medicamentos. Posterior a esto se aplicaron los criterios STOPP por revisión de historias clínicas en una institución de régimen especial teniendo en cuenta variables como el número de medicamentos, indicación, posología, duplicidad terapéutica, interacciones, contraindicaciones, entre otros. Los criterios STOPP de prescripciones potencialmente inadecuadas contemplan el análisis por sistemas fisiológicos buscando posibles interacciones medicamentosas, contraindicaciones, duplicidad terapéutica y medicamentos que puedan representar un riesgo en adultos mayores por presentar cambios en su farmacocinética. **Resultados:** El diagnóstico principal es la presión arterial alta (47%), seguida de la diabetes mellitus (10%) y otros hipotiroidismos (4%). Después de aplicar los criterios STOPP para cada una de las historias clínicas, se encontró que el 50,7% (152) de la población del estudio tenía al menos una prescripción inadecuada distribuida de la siguiente manera: 2 recetas tenían 4 criterios STOPP, 7 recetas tenían 3 criterios STOPP, 28 tenían dos criterios STOPP y 115 tenían 1 criterios STOPP. **Conclusiones:** Se encontró que la mitad de las recetas tienen al menos un criterio de prescripción inadecuado, siendo el más importante el uso inadecuado de los medicamentos no indicados o sin indicación aparente. Por último, se proponen directrices para el uso racional de los medicamentos en los ancianos con todos los detalles de esta institución.

Palabras clave: Ancianos, prescripción potencialmente inadecuada, metodología STOPP, polifarmacia, errores de medicación.

INTRODUCTION

In the Fact Sheet number 338, the World Health Organization (WHO) reported that over 50% of drugs that are prescribed, dispensed or sold improperly and half of all patients fail to consume or use its medicines adequately [1]. This is mainly related to the appearance of adverse reactions, patients perceiving that the treatment as ineffective or because the drug intake scheme is very complicated. [2]

It is a challenge for physicians to provide a comprehensive care for elderly as aging is a complex process that affects many vital and organic system; in general, as older a patient gets, more medication is needed which leads to increased morbidity and mortality. Elderly patients have significant changes in the pharmacokinetic and pharmacodynamics profiles, a decrease in homeostatic mechanisms,

prescription at different healthcare levels, among others. [3]

It can be understood as a prescribing error, the wrong drug selection by indications, contraindications, known allergies, existing drug therapy, dose, dosage form, quantity, route, concentration, frequency of administration, instructions, illegible prescriptions and prescriptions that induce errors that could reach the patient. [4]

Geriatric patients represent a great challenge for proper prescription because they have multiple comorbidities for which, in most cases, they must take medications that leads to an increased risk of Adverse Drugs Reactions (ADRs) (a 35% of patients with polypharmacy are in a risk to present an ADR, and the 12% has to be admitted in an emergency service) [5], nonadherence, and an increased risk of morbidity and mortality as evidenced by an increase in health care costs [6].

The study by Gopinath et al [6] showed that 57% of American women over 65 years use more than 5 drugs, 12% use 12 or more medications, 60% were using at least one medicine without indication and 16% presented a therapeutic duplication. This data disregards the “Over The Counter” medicines (OTC), it is estimated that over 90% of the population use at least one OTC and about 50% use 2-4 of these medications. The prescription drugs most used are those listed for the cardiovascular system, and concerning the most used nonprescription medications are analgesics, vitamins, *Ginkgo biloba*, and antacids. [6]

In a study by Bregnhoi et al [8], 212 records were reviewed and it was shown that 39.5% had at least one inappropriate prescription according to the Medication Appropriateness Index criteria (MAI). In total, 12.3% of drugs were not indicated, 6% were being ineffective, 6.7% had dose errors, 0.7% had no proper instructions, 0.7% had clinically important drug interactions, 8.6% contraindications were clinically important, 3.1% had therapeutic duplication, the duration of treatment in 16.5% of prescriptions was not adequate and 27.1% did not represent the best cost/benefit alternative. Moreover, Hanlon et al [8] showed that patients who had polypharmacy are at increased risk of inappropriate prescribing with an OR of 1.28 95% CI (1.21 to 1.36).

There are several screening tool to identify Potentially Inappropriate Prescribing (PIP). McLeod (1987) have 38 indicators, IPET (2000) have 14 indicators and Beers (2003) have 48 indicators. However, all of them have limitation due to changing evidence, the licensing of important new drugs and the recognition of a more extensive list of PIP, lacking in clinical importance or prevalence of some criteria. A PIP is described as a poor risk – benefit balance, over-prescribing, miss-prescribing, or under-prescribing.

In light of the current evidence, the number of PIP increases with age and with the number of drugs. It has shown that people over 65, have a higher risk of having a PIP that matches the consumption of more than 8 drugs. [9] This project take into account the number of patients, medications and cost of institutional attention discussed above, to identify and describe the most common PIP in elderly people in order to propose an institutional prescription guide based.

MATERIALS AND METHODS

A cross-section observational study with a retrospective collection of information was carried in elderly patients that were over 65 years, with a consumption of more than 5 medications during January to May of 2013. The study was made in a special regime medical institution of low complexity, reviewing medical records and considering variables such as number of medications, indications, dosage, therapeutic duplication, interactions and contraindications, among others.

For the calculation of sample size, a total population of 2160 people was considered, with an expected prevalence of inappropriate prescribing of 34.5% (calculated using the weighted average of the data obtained from the literature review [8, 22, 23, 24]). For a confidence level of 95%, a sample size of 300 was obtained. The selection was made by a simple random sampling without replacement, using random numbers on a spreadsheet in Microsoft Excel®.

The variables considered for the development of the study and data collection were: age, gender, ICD 10 diagnosis, the number of drugs used, drugs that are not indicated, dosing regimen, the duration of the treatment, therapeutic duplication, interactions (showed by Micromedex®), contraindications, diagnosis of kidney disease, liver disease diagnosis and finally, the prescriptions were evaluated with the STOPP criteria.

All variables were recorded on a data collection tool in Excel® 2010.

This project is considered as a without risk investigation under Article 11 of Resolution 8430 of 1993 issued by the Ministry of Health. The protocol was approved by the institutional ethics committee.

RESULTS

Sociodemographic characterization of the population

For 2011, in the institution there was a population of 2,160 people over 65, who consumed five or more drugs, which represented 16.6% of the total population and 36.3% of spending, compared to total drug budget. The average cost of each prescription in this group was COP 284,149 (CI95% 1.730-841.082) equivalent to half Colombian statutory minimum wages. The median number of drugs used was 7 (IQR 6 - 9). Of the 2,160 patients

300 clinical records were analyzed, in which the average age was 74.5 years (95% CI 73.7 to 75.4; 51.4% were women (154) and the median amount of drugs consumed is 7 (RQ 5-11).

Pathologies and prescribed medications in the geriatric population

The principal diagnosis according to ICD 10 is high blood pressure with a 47%, followed by an unspecified diabetes mellitus with a 10% and other hypothyroidisms with a 4% of the population. In general, the most frequent diseases were of the cardiovascular type, followed by disorders of the thyroid gland, lung and central nervous system.

Furthermore, it was observed that the 36% of drug consumption was related to the treatment of diseases of the cardiovascular system. The drug more frequently prescribed was Losartan with 126 prescriptions, followed by Atorvastatin with 98 prescriptions and Hydrochlorothiazide with 84 prescriptions. In the second place, a 24% of the prescriptions were drugs related to the alimentary tract and the metabolism, where the medicine more often prescribed was Omeprazole with 150 prescriptions (50% of the total population), followed by Calcium citrate + Vitamin D with 46 prescriptions.

Frequency of inappropriate prescriptions

The analysis of the study variables showed that 63.7% (191) of the indications of drugs were related with pathology, while in 36.3%, at least one of the drugs used did not have any indication when compared with the diagnoses reported in the medical record. The drug more often prescribed without being indicated (secondary prevention of acute myocardial infarction) was acetylsalicylic acid (ASA) 100 mg in patients who haven't suffered cerebrovascular events. Regarding the dosage regimen, it was found that a person was sub-dosed (0.3%) with a prescription of ASA every 48 hours to prevent vascular events and 10 people had overdosed (3.3%) primarily related to the consumption of Losartan 200 mg/day, an intake of Pregabalin of 900 mg daily, a consumption of clonidine and colchicine above maximum doses, and finally a consumption of 600 mg/day of Fenofibrate when the maximum dose of the drug is 200 mg/day. [21]

Related to the duration of treatment was found that 1% of the individuals had treatments that exceed the indicated time, among which are those with a consumption by more than three years of

Alendronate. Facing the therapeutic duplication, the 4% had drugs with the same mechanism of action mainly the following medications: Calcitriol with Vitamin D, Nimodipine with Nifedipine and over two Non-Steroidal Anti Inflammatory Drugs (NSAIDs) for pain treatment.

Regarding the pathological disorders, it is evidenced that 19.3% (58) of the population has kidney damages and 6.3% (19) have hepatic impairment. In relation to drug-drug interactions and its contraindications, this study showed that 16.6% (50) of the population had potential drug-drug with high clinically significant interactions and a 17.3% (52) had contraindications related to drug interactions-pathology as the query in Micromedex[®] showed us. Among common drug-drug interactions there are VitaminD - Calcitriol, ACE inhibitors-Allopurinol, Fibrates-Statins, Leflunomide-Methotrexate-Prednisolone, Warfarin-ASA, Clopidogrel-Omeprazole. Between the interactions drugs-disease, the most common is the use of Metformin, Allopurinol and NSAIDs in people with kidney failure.

When analyzing the beginning of treatment of diseases with second-line drugs it was found that 31.3% (94) of the population began treatment with these medications including for the management of dyslipidemia, with Atorvastatin without having started with Lovastatin, cardiovascular diseases, with Metoprolol succinate without having started with Metoprolol tartrate, gastroesophageal reflux, with Esomeprazole without having started with Omeprazole and Nifedipine without having started with amlodipine or other smaller scale calcium channel blocker; implying exhaustion of therapeutic alternatives and higher costs for the institution.

After applying the STOPP criteria to each of the medical records, it was found that 50.7% (152) of the study population had at least one inappropriate prescription distributed as follows: 2 prescriptions had 4 STOPP criteria, 7 prescriptions had 3 STOPP criteria, 28 had 2 STOPP criteria and 115 had 1 STOPP criteria. Different studies have shown a high prevalence of PIP ranging from 19.2% [10] to 58% [11], but these results depend on the methodology used for this purpose. The criterion most frequently repeated was the use of ASA without history of cerebrovascular disease with 40%, followed by the use of Pump Proton Inhibitors (PPIs) for peptic ulcer full therapeutic doses over 8 more weeks with 8% frequency.

Finally, figure 1 shows algorithm proposed to management medicines in older patients.

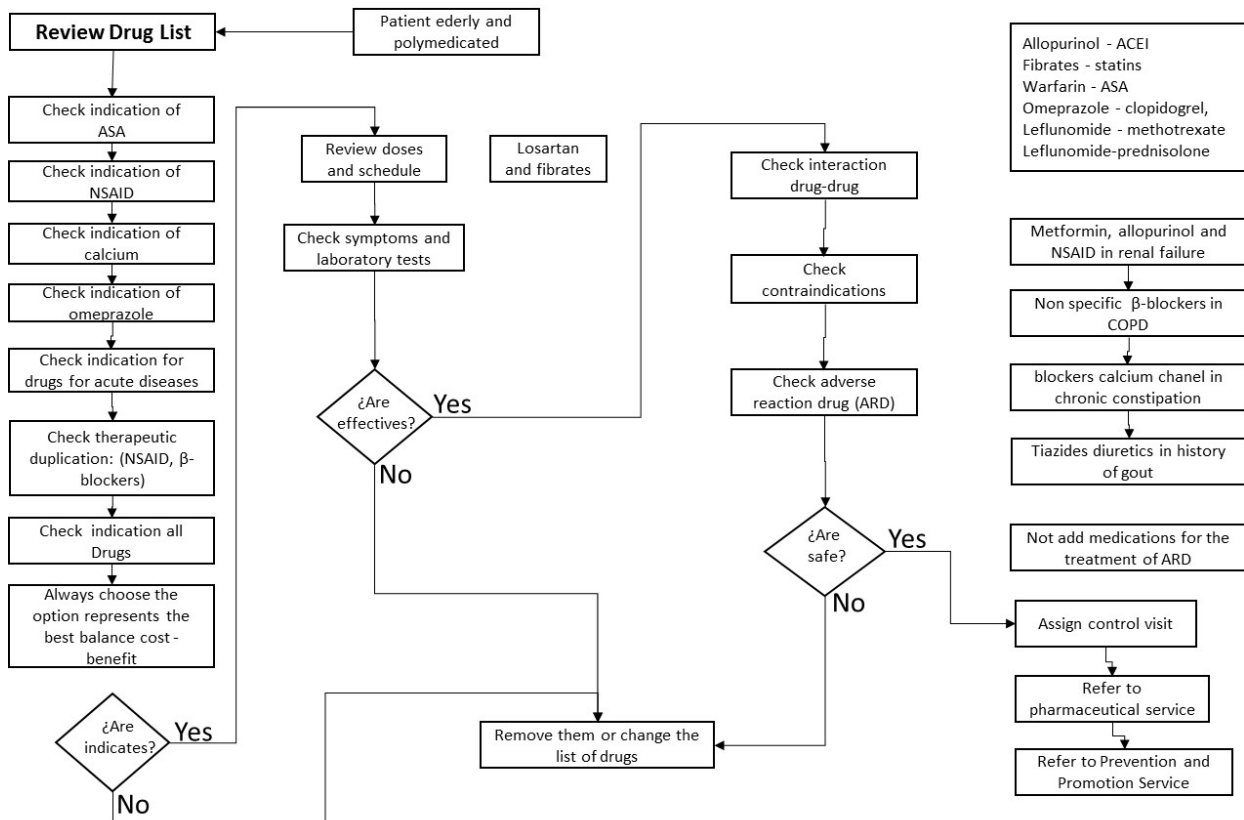


Figure 1. Algorithm to management drugs in older patients

Abbreviation: ASA: acetylsalicylic acid; NSAID: Nonsteroidal anti-inflammatory drugs; COPD: Chronic Obstructive Pulmonary Disease; ADR: Adverse Drug Reaction

DISCUSSION

There are several methodologies for evaluating inadequate prescriptions in Elderly Patients (EP), PIP were found in ranges from 20 to 58% [12-15] which showed a high risk to have a PIP in this population. STOPP and START criteria were developed in 2006 in Ireland by the European Union Geriatric Medicine Society in order to obtain a new listing that would evaluate the given PIP and pharmacological criteria of need, were validated by Delphi consensus among several researchers including geriatricians, primary care physicians and pharmacists [25]. It is noteworthy that this tool is not intended to substitute the clinical judgment, so that drug treatment should be individualized based on the needs and health problems of each EP.

All main diagnoses found are related to Chronic Non-Transmissible Diseases (NTDs) such as hypertension, diabetes mellitus and obesity affecting EP. [17] Given that hypertension and diabe-

tes mellitus are the main diagnoses found in the study, a strategy to implement in the institution is mandatory referral to the nutritionist with the aim to improve habits and health and safety measures relevant to each case.

The drug most commonly prescribed without being indicated is acetylsalicylic acid in patients who haven't suffered cerebrovascular events, because the risk of bleeding and gastric irritation is increased compared with the cardiovascular benefit when using ASA in primary prevention. [17] This result is high compared with those reported in the literature with values of 12% [5, 7] which means that it must be developed a strengthening in the review of all indications of drugs in the EP.

In literature are reported dosage errors by 6.7% [7] although the data found in this study is lower than that reported in literature, the consumption of drugs not specified and/or higher than the recommended doses, exposes the EP to the risk of adverse events related to drugs, unwanted physiological

responses to exercise, promote drug interactions, adverse reactions and more. Sometimes the EP receives medications for the treatment of acute diseases, but those are included in the prescription and without further review of the evolution of the disease are still prescribed by “repeated formula”.

On the other hand, the variable duration of the treatment, it was evidenced that 1% are with treatments over time, indicated mainly by the relation in the consumption of more than three years of alendronate, the study realized by Erviti [18] questions the effectiveness of bisphosphonates after consumption for more than 3 years because they produce alteration of the bone structure.

Although the risks of certain interactions are known, sometimes there is no alternative treatment, so the risk should be reduced by adjusting doses (in case of interactions dependent of dosage) or the schedule of the medication intake (in the event that it is an interaction in time-dependent). In case that it cannot be solved by these methods, there should be considered closely monitoring for therapeutic failure or toxicity. Furthermore, strategies should be developed for the identification and the prevention of drug prescription that can interact, such as continuous training in order to develop skills versus managing medications in EP. For example, the number of drugs prescribed should be the minimum necessary, it should be verified if they are achieving the therapeutic effect in the dose, duration and indication signs and symptoms, through reviewing and periodically sending control laboratory tests in order to monitor therapy. Also, if an adverse reaction is found, the suspected drug is removed from the list or it is substituted with a drug which has a different drug mechanism, always avoiding the prescription of medication for the treatment of adverse reactions. Particularly, in the case of EPs, if the patient evidenced weakness, dizziness, depression, incontinence, among others, medications should be suspected.

Drug-related problems (DRPs) can be classified according to their origin [19] and it is related to the supply (access or necessity), and the drug use (physiological situations that modify the pharmacokinetics, possibility of resistance, interactions among others). In general criteria STOPP are classified as pharmacological DRPs since most of them are taken into account the pharmacodynamic and pharmacokinetic changes affecting EP and considered if the drug whether or not indicated

by special physiological conditions, pathologies or the presence of another drug. Among the pharmacological criteria are most evident the use of beta-blockers in cardio-selective presence of Chronic Obstructive Pulmonary Disease and the use of calcium antagonists in patients with chronic constipation which can ultimately aggravate both conditions. The DRPs related to the use, could not be quantified in the study because of the method of data collection.

As evidenced by several studies [5, 7, 8, 12, 20, 15], consumption of more than 5 medications means a high risk of causing ADR, that added to the result of inappropriate prescribing obtained in this study, half of the population with the methodology STOPP are constantly at risk, because of that, measures must be taken for identification and prevention of PIP. It is proposed to strengthen the integration of clinical services to the pharmaceutical service that also aims to contribute in a harmonious and integral way to improve the quality of individual and collective life under the Health Promotion and Prevention.

It is necessary to separate the natural aging process of the diseases suffered by EPs to find the best balance at the time of prescription and not fall into the loop of the “medicalization of life” in the sense of considering processes related to natural aging like osteoporosis, menopause, among others as illnesses requiring treatment. It is noteworthy that in EPs and in the “less is more” drug therapy, the efficiency on prescription does not necessarily try to make it faster or cheaper, but to make it rational, in every sense of the word.

Limitations of the study

The main limitation of the study is to be conducted at an institution of special arrangements and a characteristic population, in this case EPs, so the results could not be extrapolated to other populations primarily with other care regime health. It is important to recognize this limitation though is that the EPs of the institution under study are different from other institutions because of special regime, making them of a different membership scheme that is particularly condescending and permissive.

It is important to recognize that due to the methodology of data collection, there may be a limitation related to the collection of information, caused by the diagnosis sub registry in the clinical records or the indications concerning secondary

pathologies that link the indication of drugs that are not used for the treatment of diseases object of the study. However, in cases where clearly evidenced no indication of a drug is proceeded to check up in medical history three years ago to try control this limitation.

In the application of STOPP criteria, sometimes the lack of detailed information on the medical record did not allowed to apply the criterion safely; it was applied only to the list of drugs and diagnostics reported in the medical history, which can represent a sub diagnosis and no complete record of the drug and no evidence that consumption of OTC drugs, homeopathic among others.

ACKNOWLEDGEMENTS

It is a great opportunity to present my deepest gratitude to all those who have collaborated with their help in the development of this work, especially to the Faculty of Pharmacy of the Universidad Nacional de Colombia. Authors declare that we have no conflict of interest with the results of this research.

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