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Prevalence of drug interactions in elderly patients with multimorbidity in primary care

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Abstract

Background Drug interactions (DIs) are a significant cause of medication-related problems. The aging population, high chronic diseases prevalence and polypharmacy are closely associated factors. *Aim of the review* To study the prevalence, types and associated factors of DIs in multimorbidity patients of over 65 years of age in primary care. *Methods* Relevant studies on DI prevalence in this population were reviewed in PubMed, Cochrane Library and EMBASE (January 2000–December 2015). Independent variables (duration, target population, age, sex, mean of drugs and diseases, geographical localization, DI databases used and study designs) and dependent variables (prevalence, number of DIs per 100 patients and per patient, number of clinically-relevant DIs per 100 patients, most common DI and associated factors) were classified for each article. *Results* The search generated 749 articles and 46 duplicates were discarded. After reviewing, 10 articles were included. Seven studies were observational and 3 were quasi-experimental. Seven out of 10 used interaction databases. Only 2 studies described both actual and potential DIs. The prevalence of multimorbidity patients with DI

ranged from 25.1 to 100% and the number of DIs per 100 patients was from 30 to 388.3. All the lower values correspond to the study conducted at the nursing home. This could be due to special care offered in these centres, where the medication is more controlled. The most frequent DIs were reported in five articles. However, these results could not be correlated since they were ranked using different methodologies. ACEIs, diuretics and NSAID were the most common therapeutic groups. Finally, 5 studies identified factors associated with the presence of potential DIs. The number of drugs and age were the most significant factors. *Conclusions* There is little evidence of prevalence of actual and potential DIs in elderly patients with multimorbidity in outpatient settings, showing widely heterogeneous results.

Keywords

Aged
Drug interaction
Outpatients
Patients with multimorbidity
Prevalence

Impact on practice

- The review highlights the need to check interactions in elderly patients with multimorbidity, as this can be effective in reducing drug related problem.
- Databases of interactions should be integrated into electronic prescription systems as a standard practice in health-systems.

Introduction

In recent years, health systems have been aware of the importance of patient safety as a priority objective. Medication errors and, within these, drug interactions (DIs) are one of the most important causes of potentially inappropriate medication [1]. Preventive care is becoming a priority in health systems all over the world.

DIs are defined as 2 or more drugs that interact in such a way that the effectiveness or toxicity of one or more drugs is modified. These are preventable medication errors associated with serious adverse events and death [2]. The aging population, the high prevalence of chronic diseases and polypharmacy are among the factors closely associated with potential DIs. Moreover, the elderly

population is growing, resulting in a concomitant increase in chronic diseases and functional impairment [3] which require multiple medications or polypharmacy [4, 5]. This group of patients presents difficulties in the primary care setting since the handling of different health problems is particularly complex, as it is a higher-risk population. Patients with multimorbidity are potentially more likely to experience safety incidents, such as DIs, due to the complexity of their needs and the frequency of their interactions with the health services. A recent review concluded that the association between multimorbidity and patient safety is complex and varies with the type of multimorbidity and safety incident [6].

Understanding of the interactions and the assessment of its clinical relevance in patients with multimorbidity as well as the stratification of its severity can help optimize the quality of prescribing in these patients, thus improving their safety. A review of the literature has revealed no papers that summarise all the available evidence about this group of patients who are the most susceptible to suffering DIs.

Aim of the review

The aim of this review was to summarize the publications that focus on the prevalence, types and associated factors of DIs in over 65-year-old patients with multimorbidity in primary care.

Methods

Search strategy

MeSH terms and keywords were used to search the MEDLINE, Cochrane Library and EMBASE databases (June 2000 to December 2015) (Table 1). Publications prior to 2000 were not included in the search in order not to distort the prevalence data as, during this period, there was a greater increase in the number of drugs used for chronic pathologies. Database searches were supplemented by hand searches of references lists of the papers included. We excluded studies in languages other than Spanish or English.

Table 1

Full search strategy used in ~~medline~~MEDLINE and ~~embase~~EMBASE

#1. (drug interaction[MeSH Terms]) AND prevalence[MeSH Terms] #2. (drug interaction AND prevalence) #3. (((((ambulatory care[MeSH Terms]) OR primary care[MeSH Terms]) OR outpatient[MeSH Terms]) OR nursing home[MeSH Terms]) OR ambulatory) #4. (ambulatory care OR primary care OR outpatient OR nursing home) #5. (((((chronic) OR elderly[MeSH Terms]) OR old*) OR aged[MeSH Terms]) OR pluripathological) OR multimorbid*) OR comorbid*[MeSH Terms])

#6. (chronic OR elderly OR old* OR aged OR pluripathological OR multimorbidit* OR comorbidit*) #7. #1 AND #3 AND #5 #8. #2 AND #4 AND #6 #9. #7 OR #8 #10. limit 10 from Jan 2000 to Dec 2015	
#1. ‘drug interaction’/exp OR’drug interaction’ AND (‘prevalence’/exp OR prevalence) AND [2000–2015]/py #2. ‘ambulatory care’/exp OR ‘ambulatory care’ OR ‘primary care’/exp OR ‘primary care’ OR ‘outpatient’/exp OR ‘outpatient’ OR ‘nursing home’/exp OR ‘nursing home’ #3. ‘chronically ill’ OR ‘elderly’ OR ‘aged’ OR pluripathological OR ‘multimorbidity’ OR ‘comorbidity’ #4. 1# AND #2 AND #3	

Inclusion and exclusion criteria

We identified all the published articles that contemplate DIs in elderly chronic patients with multimorbidity in an outpatient setting. Elderly was defined as being over 65 years of age [7, 8] and patients with multimorbidity as those with two or more chronic diseases. Studies providing prevalence of interactions or data to be calculated were included. The actual DIs were defined on the basis of clinical evidence of an adverse effect on the patient, and potential DIs were defined as those described in an interaction database.

Exclusion criteria were: reviews, articles focused on hospital settings, articles not including patients with chronic conditions, those focused on specific diseases or interactions, articles including only DIs by plants or articles including only interactions between drugs and diseases or nutrients. Papers whose full text could not be found were also excluded.

Review procedure and data extraction

Two reviewers (SSF and MIGR) independently assessed publications for eligibility. The decision to include studies was initially made based on the study title and abstract; when a study could not be definitely excluded, the full text was obtained for evaluation. When more than one publication was found about the same study, that which included the most interesting specific information was selected. Discrepancies between the assessors were resolved by another researcher (BSR).

Independent variables were tabulated: study duration, target population, geographical location, DI databases used and study designs. The average age, drugs and diseases were also collected.

The main outcomes recorded in this study were:

(I) Prevalence of patients with DIs: defined as the number of patients having at least one DI divided by the total number of patients studied.

(II) Number of DIs per 100 patients: defined as the number of DIs in the total study population.

(III) Number of DIs per patient: defined as the number of DIs divided by the number of patients suffering at least one DI.

(IV) Number of clinically relevant DIs per 100 patients: defined as the number of clinically relevant DIs in accordance with the authors' and database criteria (Table 2).

Table 2

DI definition in according to database

References	Interaction database	Classification of DI	Clinically relevant
[10]	Thompson micromedex program	A: they are not of clinical importance	C D
		B: the effect of the interaction has not yet been established	
		C: DI causes possible changes in the therapeutic effects, or can effects, or may cause adverse effects, but can be avoided adjusting the individual drug doses	
		D: DI is a potential for severe adverse effects; individual dose adjustment is difficult in these cases	
[11]	DDIs Database Information System	Major severity: no defined and no access to database	Major Moderate
		Moderate severity: no defined and no access to database	
		Minor: no defined and no access to database	
[14]	Drug Reax system Bot database	Major severity: DI can cause hospitalization or death	Major Moderate
		Moderate severity: DI can produce a clinical deterioration of lesser entity without requiring hospitalization or death	

References	Interaction database	Classification of DI	Clinically relevant
		Minor severity: DI without detectable clinical consequences	
[15, 16]	ABDA database ~~http://www.wuv-gmbh.de~~	Serious relevance: DI is life threatening, permanent physical disabilities are probable	Serious Moderate
		Moderate relevance: Dosage adaptation is necessary and/or concomitant treatment requires continuous monitoring	
		Minor relevance: DI is barely affecting patient's health. DDI applies for special patients groups	
		Insignificant relevance	
		Not evidence	
[17]	Lexi-Interact® database	A: no known interaction	C D X
		B: specified agents may interact, but there is little or no evidence for clinical concern	
		C: specified agents may interact in a clinically significant manner and monitoring of therapy is suggested	
		D: two medications may interact in a clinically significant manner and modification of therapy is suggested	
		X: contraindicated combination	

(V) Most common DI.

(VI) Factors associated with potential DIs. Study of possible factors associated with potential DIs including patient characteristics and drug therapy characteristics.

All dependent variables were measured, whenever possible, for both clinical and potential interactions.

Quality assessment of the studies

A twelve-item quality assessment tool was used, based on the criteria for assessing the quality of medication error studies, which was described by Nabovati et al. [9]. Overall quality scores ranged from 0 to 12 (0–6 points = poor; 7–9 points = moderate; 10–12 points = high).

Qualitative aggregated results were mainly reported due to variations in the methods used when reporting DIs statistics.

Results

Searches identified 749 articles, of which 46 duplicates were discarded. After the initial screening of titles and abstracts, 100 full-text studies were assessed for eligibility. Subsequently, 10 articles met the inclusion criteria [10, 11, 12, 13, 14, 15, 16, 17, 18, 19]. Figure 1 shows a flow diagram.

Fig. 1

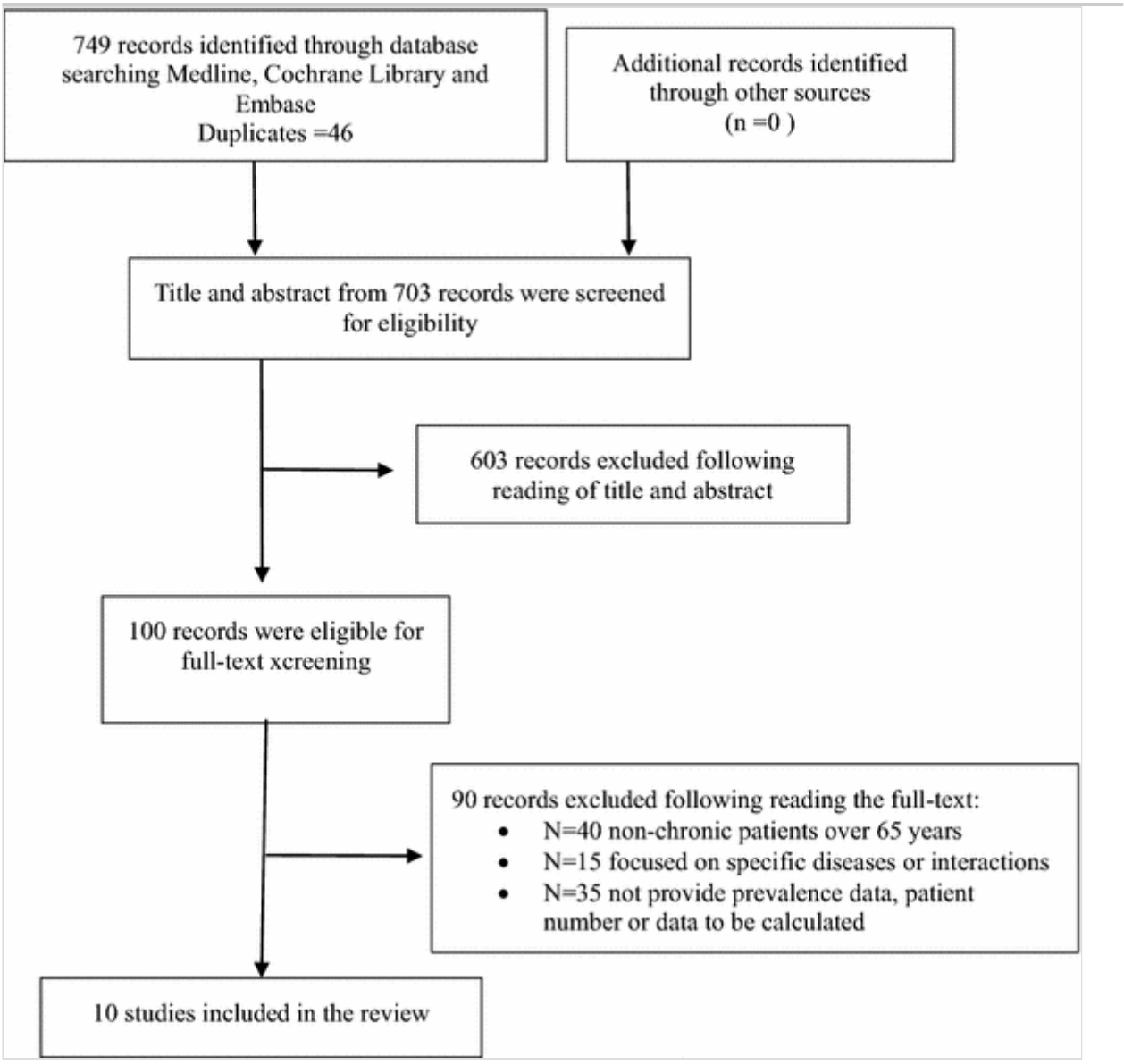

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Table 3 shows their general characteristics. Seven studies were observational and three were quasi-experimental. Eight out of 10 used interaction databases, while the remaining two used a list developed by Malone et al. [20] and the Medication Appropriateness Index (MAI) [21]. Seven of them were performed in different regions in Europe and the remaining three were carried out in America, Taiwan and Mexico.

Table 3

Descriptive analysis of the included studies

References	Duration	Target population	Age	Mean of drugs	Mean of diseases
[19]	No specified	African American who suffer from chronic health conditions	65–94	7.68 ± 4.02	5.23 ± 3.01 0–17 illness
[18]	Jun-2006 to Dec-2008 baseline	Elderly, mostly multimorbidity patients with limited mobility	78.3	6.3 ± 3.7	7.8 ± 3.3
[17]	Oct-Dec 2011	Elderly patients with 2 o more prescriptions discharged from the Internal Medicine Clinic	72 (65–91)	4 (range 1–8)	6 (range 2–14)
[16]	Jun-2006 to Dec-2008	Elderly, multimorbid population	78.82 ± 8.2	6.8 ± 3.3	6.3 ± 3.7
[15]	AGnES 1 Nov-Dec 2005	Elderly, multimorbid population with reduced mobility	74.8 ± 10.7	6.7 ± 3.1	No specified
	AGnES 2 March–May 2006		70.8 ± 9.7	7.5 ± 3.8	
	AGnES 3 Oct 2006-March-2007		75.5 ± 7.5	7 ± 3.5	
[14]	March-2003 to March-2005	Pluripathological and polymedicated patients	74.5 ± 9.8	8.46 ± 2.49	2.5 ± 2.6

References	Duration	Target population	Age	Mean of drugs	Mean of diseases
[13]	Jan-2004 to Jan-2005	Geriatric population	81.7 ± 7.4	5.1 ± 3.6	2.05 ± 1.46 (Charlson Comorbidity index)
[12][a]	2004	Patients with CCDG score ≥2	–	–	–
[11]	Sept-2006	Nursing home residents	75.5 ± 11.8	5.74 ± 2.4	2.36–2.75
[10]	2006	Ambulatory patients, who used Mexican Instiute of Social Security family medicine clinics	69 (50–94)	5.9 ± 2.5	3.4 ± 1.5

Charlson Comorbidity index = a measure of the presence of multiple co-morbid diseases [22]

CCDG = chronic condition drug group to quantify level of comorbidity [23], adapted fr

AGnES = (German) Arzt-entlastende, Gemeinde-nahe, E-Healthgestützte, Systemische I community-based, e-health assisted, systemic intervention

[a]Age, mean of drugs and diseases could not be calculated because patients with CCDG s

Quality of the studies

After the quality assessment of individual studies, one of them fulfilled all the quality criteria. Three studies were of a higher quality (10–11 points), and the remaining 6 were of moderate quality (7–9 points). In terms of the quality assessment criteria, 2 studies do not detail whether they are potential or actual DIs, 8 studies listed their limitations, 6 studies defined the categories of DIs and DIs were classified in 4 of them. Three studies did not describe the setting, and one did not describe the subjects.

General characteristics and prevalence of drug interactions

Table 4 shows the DI prevalence data that depends on the information they provide. Among them, only 2 articles described actual DIs [13, 17]. Marusic et al. [17] detected actual DIs in 21 patients (9.5%) and the DIs resulted in possible adverse effects in 19 patients. Twelve different drug pairs that led to

actual DIs were detected, of which 9 were C-level and 3 were D-level and had clinical significance. Moreover, angiotensin-converting enzyme inhibitors (ACEIs) represented the drug class most frequently associated with actual DIs. On the other hand, Tulner et al. [13] identified that in 25.5% of patients (172 patients), a drug combination was responsible for at least one possible adverse drug reaction (ADR).

Table 4

Study of DIs prevalence

References	No. patients female (%)	No. patients with DI	Prevalence patients with DI	No. DI[a]	No. DI per 100 patients	No. patie
[19]	400 (65%)	211	52.7	–	–	–
[18]	Baseline data 779 (71.4%)	454	58.3	–	–	–
	Follow-up data 393	Intervention 1: 242	61.6			
		Intervention 2: 201	51.2			
[17]	222 (56.3%)	190	85.6	–	–	–
		21	9.5	–	–	–
[16]	779 (71.4%)	Total: 626 Minor: 163 Moderate: 454 Serious: 9	Total: 80.4 Minor: 20.9 Moderate: 58.3 Serious: 1.2	Total: 3025 Minor: 1673 Moderate: 1326 Serious: 11 Insignificant:15	388.3	3025
[15]	AGnES 1 18 (83.3%) Only 16 were checked	16	100	Total: 56 Minor: 24 Moderate: 30 Serious: 0 Insignificant:1	350	56/1
	AGnES 2 23 (87%) Only 19 were checked	25	55.6	25	55.6	25/2

References	No. patients female (%)	No. patients with DI	Prevalence patients with DI	No. DI	No. DI per 100 patients	No. patie
	AGnES 3 37 (62.2%) Only 26 were checked					
[14]	283 (48.1%)	250	88.3	Total: 1053 Major/moderate: 754	372.1	1.54
[13]	674 (67%)	300	44.5	398	59.1	398/
		172	25.5	158	23.4	158/
[12]	9115	6941	76.2	8894	97.6	8894
[11]	323 (54.7%)	81	25.1	Total: 97 Minor: 27 Moderate:63 Major: 7	30.0	97/8
[10]	624 (78.7%)	492	78.9	–	–	–

[a]Values by DI categories are given if they are provided

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Moreover, only 4 studies reported all variables evaluated in our review [11, 14, 15, 16] and 7 studies reported data on potential DI prevalence [10, 11, 13, 16, 17, 18, 19]. In the remaining studies this data was calculated. In general terms, the highest prevalence value was 100% in the AGnES part 1 (General Practitioner-Supporting, Community-Based, e-Health Assisted, Systemic Intervention) of the study by Fiss et al. [15], and the lowest was 25.1% in the study by Liao et al. [11], which is the only article at a nursing home. Only 4 articles grouped the DIs identified in terms of severity and reported the percentage of major, moderate and minor DIs separately [11, 14, 15, 16] and 2 articles as type C and D [7, 14]. Moreover, Hoffman et al. [16], in accordance with the ABDA classification, calculated the prevalence as moderate (58.3%) and serious prevalence (1.2%). In the light of this, only 6 studies evaluated the clinically relevant DIs [10, 11, 14, 15, 16, 17]. The number of DIs per 100 patients varied between 30 and 388.3 and the clinically relevant

DIs per 100 patients was between 21.7 and 187.5 [11, 15]. Once again, all the lower values correspond to the study conducted at the nursing home.

The most frequent DIs in elderly chronic patients were reported in five articles [10, 11, 14, 16, 17]. However, these results were ranked using different methodologies that show different results which could not be correlated. Hoffmann et al. [16] evaluated the most prevalent DIs with respect to the total number of DIs, reporting that the combination of potassium excretion diuretics with nonsteroidal anti-inflammatory drugs (NSAIDs) was the most prevalent moderate potential DI. Another 2 articles showed the most prevalent DIs with respect to the number of patients with DIs [10, 17]. Dubova et al. [10] concluded that ACEIs + potassium-sparing diuretics (as type D) and ACEIs + NSAIDs (as type C) were the most prevalent and Marusic et al. [17] showed that those were ACEIs + diuretics (such as type D) and warfarin + acetylsalicylic acid (AA) (as type C). Finally, another 2 articles determined that the most frequent moderate DIs were digoxine + spirinolactone [11] and ACEIs + AA [14].

The drugs which most contributed to DIs were only reported in 1 study [14], with AA (29.7%), ACEIs (20.1%) and furosemide (13.8%) as the three most frequent.

Factors associated with potential DIs

Five studies have identified factors associated with the presence of potential DIs [10, 11, 12, 14, 16]. All of these used logistic regression to estimate the influence of these factors on DIs. The number of drugs, as a factor significantly associated with having one or more potential DIs, was included in all the studies and the number of diagnoses was only studied in 2 of papers [10, 12]. Different medical diagnoses were also assessed in 2 studies [10, 16].

Table 5 summarizes only significant data. The number of drugs and patient age were significantly associated factors in all of them.

Table 5

Factors associated with the presence of potential DIs

References	Dependent variable	Independent variables	Univariate analysis	Multivariate analysis

[16]	Presence of potential DIs with moderate or serious clinical relevance	Age (5-year categories) Gender No. of drugs Medical diagnoses Support in drug administration Level of nursing care Favourite pharmacies		No. of drugs Endocrine, nutritional and metabolic disease Diseases of musculoskeletal system (Adjusted for age and sex)
[14]	Presence of DIs clinically relevant	Relationship with carer Heart failure Ischemic heart disease Musculoskeletal, autoimmune or chronic renal failure Health centre No. of hospital admission No. of drugs	Ischemic heart disease Musculoskeletical, autoimmune or chronic renal failure No. of hospital admission ≥2 No. of drugs ≥7	
[12]	Presence of DIs	Age Gender Geographic location CCDG score level No. of drugs		65–74, 75–84, Reference 50–64 years CCDG score: 2–3 and Reference 0–1 score No. of drugs
[11]	Presence of DIs	No.of drugs categorized as taking 1–2, 3–4, 5–6, 7–8, 9	No. of drugs ≥9 (Reference group: taking 1–2)	
[10]	Presence of DIs	Age ≥60 Gender Marital status Literacy No. of chronic conditions Diagnosis No. of drugs	Patient age ≥60 No. of disease ≥3 No. of medicines ≥5 Cardiovascular disease Endocrine, alimentary and metabolic disease	Patient age ≥60 Cardiovascular disease No. of drugs ≥5 (Adjusted for No. of disease □3 and endocrine, alimentary and metabolic disease)
The studies use the regression analysis in order to identify these factors. The table only described the significant data in the studies				

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Discussion

The main contribution of this study is to provide an overview of the DIs prevalence as well as types and associated factors in elderly chronic patients with multimorbidity in the first line. This is the first review that summarizes the available evidence of potential and actual DIs in this population of patients and analyses all the field research that assesses its prevalence.

Many studies have assessed the prevalence of actual and potential DIs, but their target populations are patients with polypharmacy and/or who are elderly, without any mention to the number of chronic diseases. Therefore, there is little evidence of prevalence data of DIs in our target population. The overall quality of DI studies was moderate, perhaps due to the lack of a standard guideline for designing methodology. Despite the low number of studies, our review showed wide variations in prevalence data, ranging from 25.1 to 100%. The lowest prevalence was found in the only study whose setting was in a nursing home. This could be due to special care offered in these centres, where the medication is more controlled. On the other hand, the highest prevalence was observed in the study by Fiss et al. [15], which was due to the fact that, out of the 18 patients included, only 16 were checked for potential DIs, since the remaining patients took a small number of drugs. The remaining studies observed a prevalence of potential DIs of between 44.5 and 88.3%, which may be considered high.

Although some potential interactions do not cause a real clinical effect and high prevalence values may overestimate the true clinical significance of the problem [25], there is evidence that DIs lead to avoidable hospital admissions [26].

Our results are probably attributable to the special characteristics of our target population. In other papers, in which the target patients are only the elderly and who take more than 2 drugs, the prevalence data is also very variable. For example, in a European study of 1601 elderly outpatients living in six European countries, 46% of patients had at least one potential clinically significant DI, and 10% of these interactions were regarded as of high severity [27].

The 2 studies that focus on actual DIs showed very different results (9.5 and 25.5%). Our findings, in accordance with others, confirm that there is little evidence of the incidence of actual DIs in comparison to potential DIs in literature. This may be due to the fact that identifying actual DIs is much more complicated than potential DIs [9].

In view of this, and attempt to reach an overall mean prevalence of DIs is difficult and all these results should be interpreted cautiously. We believe that the heterogeneity among the studies is the main reason that makes the

interpretation of the results difficult. Several considerations must be borne in mind when interpreting them. Firstly, there is variability in terms of methodology. In most studies, the medication was obtained from medical records and/or electronic prescription and analysed using different databases, DI lists or MAI [10, 11, 12, 13, 17]. However, other studies collected data from home medication reviews [15, 16, 18] and two studies used an interview to examine medication. Review of medical records is possibly the method that detected the highest number of DIs when compared with other methods [26]. Moreover, regarding databases, there is variability in how to define their clinical importance. The databases, the classification of clinical relevance and criteria used can have a significant effect on the number of DIs identified, and as a result, on their prevalence, leading to misunderstandings if interactions are not carefully evaluated [28]. Rodriguez-Terol et al. [29], highlighted the great differences in the number of DIs included, the criteria for clinical significance and other characteristics of different widely-used databases. In this way, we must take into account that databases are not specific to elderly chronic patients with multimorbidity. Moreover, there is no universal list of medications and criteria for assessing the overall medication used by older patients with multimorbidity [5].

Secondly, the results differ depending on the type of pathologies of the target population [25]. Finally, different sample sizes and geographic locations can also affect prevalence data. Countries use different sets of medications due to registration issues and/or local drug procurement policies and a structure for financing medication that may contribute to differences in prescription patterns [5]. Furthermore, differences in the quality of prescribing across geographical regions have also been highlighted recently [30].

ACEIs, diuretics and NSAID are the most frequently therapeutic groups involved. Age-related changes in renal function make elderly patients susceptible to the renal effect of ACEIs, especially if administered concomitantly with other drugs that can influence renal function such as diuretics [31]. Altered renal function also puts elderly patients at great risk of medication-induced alterations in potassium homeostasis [32]. Other authors have shown that the interaction between ACEIs and other potassium concentration-increasing drugs is one of the most frequent DIs in hospitalized and non-hospitalized patients [33, 34].

With respect to associated factors, the results show that DI prevalence in patients with multimorbidity is associated with polypharmacy, age and the number of illnesses, in concordance with previous knowledge about chronic patients [25, 35, 36, 37, 38, 39]. DIs frequently occur in older adults due to shared

metabolic pathways between the drugs themselves [19, 40], as well as the use of multiple medications. Moreover, polytherapy increases the complexity of therapeutic management and thereby the risk of clinically important DIs, which can both induce the development of ADR or reduce clinical efficacy. Furthermore, age is highly associated with the altered metabolism of some drugs.

This review has several limitations. It is based on a literature search of three databases, although the search carried out for articles in the references of previously selected studies may have compensated this limitation. Numerous articles could not be included since the number of diseases was not specified, and we have thus not been able to determine the condition of patients with multimorbidity with certainty.

This article emphasizes the need for physicians to be vigilant regarding potential DIs in a population with comorbid conditions. Furthermore, the number of drugs used to treat elderly chronic patients should be minimized to reduce the incidence of DI-related ADRs. Nevertheless, it is sometimes difficult to reduce the number of drugs prescribed for patients with multiple chronic conditions. Therefore, other therapeutic alternatives as well as the monitoring of chronic treatment by a multidisciplinary team could greatly reduce exposure to DIs [41].

In the future, it would be desirable to have improved technology and the existence of a preventive tool against patients' exposure to DIs. Databases of interactions should be simple and more integrated into electronic prescription systems, as has been common practice in some European countries for over 20 years. The databases should be more accurate and successful in guiding physicians to prescribe safely and appropriately. Any action that reduces morbidity in this patient group can have a high impact on the consumption of resources, both in hospitals and in primary care.

Future studies should focus on DI criteria that have sufficient clinical significance and are relevant to elderly patients with multimorbidity.

Conclusions

In spite of scant evidence of the prevalence of actual and potential DIs in elderly patients with multimorbidity in outpatient settings and the heterogeneous results, we can conclude the prevalence in this population is high, with ACEIs, diuretics and NSAID being the most common therapeutic groups. Moreover, the number of drugs and age are the associated factors that are most significantly involved.

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Conflicts of interest None.

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