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Proactive inter-disciplinary CME to improve medication management in the elderly population

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ABSTRACT

Background: The absence of collaboration between health professionals is known to influence prescriptions' quality, also disadvantaging elderly frail patients' polytherapies.
Objectives: This study aims to improve the adherence to medications of elderly patients suffering from multiple diseases through interpersonal continuing medical education (CME). The CME was organized for general practitioners (GPs) by hospital pharmacists (HPs) from a Territorial Pharmaceutical Centre of Piedmont, in collaboration with pharmacists from the Drug Science and Technology Department of the University of Turin, to enhance awareness on the management of chronic therapies and de-prescription.
Methods: Pharmacists set face-to-face lessons for GPs between April 2018 and November 2018, while therapies' reconciliation and delivery of the Illustrated Therapy Schedules (ITS) lasted until September 2019. Polytherapies were evaluated by pharmacists and GPs in terms of appropriateness (number of potentially inappropriate prescriptions - PIPs according to 2019 Beers Criteria) and number of drug-drug interactions (DDIs), using a clinical decision support system (CDSS - NavFarma©) to help health professionals dealing with the process of review, reconciliation and individuation of possible adverse reactions.
Results: From the CME organization it emerged that the collaboration between health professionals supported by a CDSS could improve the quality of elderly patients polytherapies. Two-hundred fifteen patients were enrolled by GPs; patients included were aged – results reported as average (sd) – 76.4 (6.3), mostly men (54.9%), number of daily medications per patient was 8.1 (2.4); 2.1 (1.8) DDIs per patient were individuated, 12.9% of which were solved thanks to the CME. Average number of PIPs found was 2.5 (1.4) per patient.
Conclusions: The CME represented a proactive approach by HPs to the management of elderly patients' polytherapies. Moreover, clinicians' engagement is a mean to enhance quality, safety, professionalism and communication in health processes.

Introduction

The growing number of older people suffering from non-communicable chronic diseases is reaching a critical point. Those aged over 65 will account for 20.4% of the population in 2020, and that figure is expected to increase by 3–3.5% each decade.[1,2] Moreover, it is known that the prevalence of multimorbidity, defined as the coexistence of more than two non-communicable chronic diseases, ranges from 30 to 60% in the older population according to several studies on chronic conditions.[3–6]

Non-communicable chronic diseases have been the focus of a great number of studies, with diabetes, hypertension, coagulation problems and depression being the prevalent pathologies.[7–12] Each of these illnesses represents a risk factor in itself, meaning that combinations of them in older, multi-pathology and multi-therapy patients may be crucial to causing even worse outcomes.

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Frailty is often defined as age-related decline that is commonly associated with multimorbidity.[13] Identifying vulnerable patients in a pre-frailty stage is not as easily accomplished as it is for other relevant physical, mental and socio-economic issues by health professionals. Cited factors can make patients more likely to experience difficulties in handling their therapies.[14] Moreover, self-consciousness of these conditions is often rejected, and evidence of frailty may not be well accepted by older patients.[15]

The importance of the above-cited issues has also been underlined by the European Medicines Agency.[16] While patients that follow their therapies appropriately are less likely to experience hospitalization or a worsening of their morbidities, the mismanagement of drugs may lead them to adverse drug reactions (ADRs) and to further damage, which itself may become an additional cause of non-adherence to treatment, as well as to increased costs for National Health Services (NHSs).[17–22]

Research on ageing, adherence and its methodology are specific objectives for the European Commission. As Action Group A1 of the EIP on AHA (European Innovation Partnership on Active and Healthy Ageing) stated, interventions supporting older frail patients will be a key point of geriatric handling solutions, to take care of all the elderly in future.[23] It is acknowledged that patient health proportionally improves with adherence to therapy, and this concept has also been transposed into the Italian Chronicity National Plan.[24] A World Health Organization (WHO) Recommendation on the proactive actions that can be implemented to guide multidisciplinary teams on the topic of polytherapy has been published. It focuses on the two actions of *reviewing* and *reconciling* the elderly's polytherapy and was consequently published as an official document by the Italian Ministero della Salute.[25,26]

One possible strategy to improve the management of the elderly population's polytherapies can be found in the collaboration of health professionals and in the strengthened cooperation between hospital pharmacists (HPs) and general practitioners (GPs). Continuing medical education (CME) has been identified worldwide as a successful means to promote an inter-disciplinary approach, to support the engagement of clinicians and to improve quality, safety, professionalism and communication in health processes.[27]

Aim of the study

This paper reports the results of a CME intervention that was set up by HPs from a Territorial Pharmaceutical Centre in Northwest Italy and that was addressed to a group of GPs in collaboration with researchers from the Drug Science and Technology Department (DSTD) at the University of Turin. Primary purpose of this work was to encourage the collaboration between health professionals; specifically, HPs proactively proposed a variety of useful tools to GPs to deal with the process of therapy reconciliation and detection of possible ADRs. Secondary objectives were *a.* to monitor the polytherapies of elderly frail patients, *b.* to improve medication appropriateness and adherence to treatments, to enhance the engagement of patients suffering from multiple diseases.

An existing clinical decision support system (CDSS) was implemented thanks to the combined work of engineers, physicians and pharmacists, and it was used for the evaluation and selection of a frail elderly population starting from a set of prescription-based criteria.

Ethics

All personal data were replaced with a univocal numerical code and the work was carried out on an anonymous database in compliance with general data protection regulation (GDPR-EU) 2016/679. Informed consent was collected.

Material and methods

The study was carried out from April 2018 to September 2019. The CME was structured over four sessions: 1) updating expertise on the process of elderly patient polytherapy review; 2) the use of a CDSS and collaboration with HPs; 3) reconciliation and production of an illustrated therapy schedule (ITS) for each patient; 4) communication with patients and delivery of the ITS. Each session included a face-to-face lecture followed by a period of active engagement on the topics examined.

The analyses in the period within frontal sessions were conducted using a CDSS created by Infologic s.r.l., which met the specific demands of the team. The CDSS provided the number of medications per patient, number of daily dosage units, number of potentially inappropriate prescriptions (PIPs) according to the Beers Criteria and the number and severity level of drug-drug interactions (DDIs) using the Micromedex® database.[28,29]

The project included the GPs in a three-stage process: identification of the most critical patients (among those aged 65 and over), review and reconciliation of their therapies.

A score, which was set as a result of the contribution of both GPs, HPs and informatics, as reported in Table 1, was used to stratify patients aged over 65 according to their polytherapy, prescription regimen and type of pathology.

Questionnaires were administered to GPs and patients to evaluate the proposed program.

Study design and setting

The study was conducted on patients assisted by a maximum of 20 GPs in the Northwest Italian region of Piedmont in the district ASL TO4 (Azienda Sanitaria Locale Torino 4).

Seminars were held between April 2018 and November 2018. Each session consisted in a one-day seminar in which different health professionals handled the topic of medication management in the elderly under the direction of pharmacists. GPs activities were held throughout the CME and continued until September 2019 in order to complete therapy reconciliation and the delivery of the ITSs, which were elaborated by the pharmacists in collaboration with the data analysis company Infologic s.r.l. Specifically, each GP was asked to enrol about 20 patients (minimum 15 maximum 20) with the following characteristics: aged over 65 years old, suffering from multiple non-transmissible chronic diseases. Exclusion criteria included: being under 65 years old, death, need for acute care and several changes of daily chronic therapy.

Elderly prescription appropriateness

Prescriptions were analyzed using the latest version of the Beers Criteria (2019) to identify PIPs. Starting from the anatomical therapeutic chemical (ATC) code for each drug, the total number of inappropriateness per patient was calculated by the CDSS, with pharmaceutical formulation, dosage and patient diagnosis being

Table 1
Score calculation. Two categories make up the total score: polytherapy evaluation and pathology type. Pathologies refer to specific ATC codes (*diabetes*: A10; *hypertension*: C02, C07, C08, C09; *vitamin K antagonists*: B01AA; *depression*: N06A; *coagulation -others-*: B01AB-C-D-E-F-X).

Polytherapy	Score
Each drug taken daily	1
1 to 5 dosage units/day	1
6 to 10 dosage units/day	3
More than 10 dosage units/day	5
Pathology	+
Diabetes	8
Hypertension	6
Vitamin K antagonists	3
Antidepressants	2
Other anticoagulants and anti-platelet agents	1

considered for evaluation. For the purpose of the analysis, low dosages of digoxin and aspirin were excluded as indicated in Table 2 of the 2019 Beers Criteria,[28] since the CDSS was not designed to do it automatically.

DDIs together with the PIPs were evaluated and double checked by pharmacists and GPs using the Infologic's CDSS, which was linked to the Micromedex® database.

Statistics

Data processed by the CDSS were extracted, collected using Microsoft Office software (Excel and Access) and R-software was used for analysis.[30] Drugs were classified according to their ATC code. The enrolled patients were anonymized using a univocal code that could identify them in the CDSS.

Absolute and relative frequencies of dichotomous and categorical variables, and either the mean or standard deviation (sd), were calculated, as appropriate.

Results

The general characteristics of the enrolled population are reported in Tables 2 and 3.

Based on the ITSs delivered and the data collected, a deep analysis was carried out on the patients included in the study.

Nineteen GPs effectively started the CME frontal lessons and only 13 were actively involved and completed the process of reviewing and reconciling the polytherapies with the collaboration of the pharmacists. The drop-out phenomenon of 6 GPs was probably due to a low aptitude for technology, a lack of interest or inconvenience of using an additional prescribing software.

Using the CDSS, each GP reviewed the polytherapies of about 20 patients in collaboration with the HPs and with support from the DSTD. The total number of elderly patients enrolled was 227, with 12 being excluded for the reasons reported in Table 3. The included patients were stratified by age as reported in Fig. 1: patients aged between 75 and 84 years old were the most numerous (48.4%), followed by the 65–74 group (41.8%) and a smaller percentage of over 85s (9.8%). The patients included were mostly men (54.9%); the average number of daily medications per patient was 8.1 (2.4).

For the 215 patients included in the study, a total of 1976 prescriptions were recorded by the CDSS, corresponding to 274 different active substances. Table 4 shows the distribution of the medications over the whole sample, according to their ATC class, including age-stratification. Drugs for the cardiovascular system were the most commonly prescribed, followed by the alimentary tract and metabolism.

Similar data were obtained when analyzing each patient subgroup.

Over the whole sample, the three drugs that were most frequently prescribed were in line with the type of patients selected by the score; acetylsalicylic acid for the treatment of chronic ischemic heart disease, which was present in more than half of the therapies (51.6%), followed by metformin and atorvastatin (43.7% and 41.9% respectively). No psychotropic drugs were present in the top ten prescriptions. Central nervous system (CNS) drugs were 6.0% of the total prescription number; pregabalin was the most frequent active substance and it was prescribed for the treatment of neuropathic pain, whereas the following sertraline and citalopram were prescribed for depression. Together, these three made up almost half of all the CNS drugs. Despite the characteristics of the patients included in the study, it should be noted that dementia was not found among the most frequent diseases, with only three dementia diagnoses and two memantine prescriptions occurred. Table 5 shows the distribution of medication prescriptions in the pool, focusing on the first ten active substances found.

Table 3
General characteristics of the CME sample.

Data	N (%)
Enrolled General Practitioners	19
Active General Practitioners	13 (68.4)
Total patients enrolled	227
Patients included	215 (94.7)
Exclusion criteria	
change of GP, under 65 years old	3
deaths	5
transplant	1
dialysis	1
hospitalization	1
cancer	1
Reconciled ITSs	215 (100)

PIPs were detected for each patient using Infologic's CDSS software, and both GPs and HPs were alerted when these occurred. The total number of PIPs was 469, which corresponds to 23.7% of the total number of prescriptions. This is above the estimated prevalence reported in two studies conducted on 860 and 532 patients respectively.[31,32] It should be noted that GPs were asked to select patients with the most complex therapies and therefore a higher proportion of PIPs was expected. The percentage was slightly higher in the over-85s group (30.4%). Of the total number of PIPs, 205 were encountered in prescriptions to females and 264 to males - average age 77.0 (6.2).

Table 6 reports the results obtained, which are stratified by drug classes, both in the whole population and in each subgroup; 189 patients presented at least one PIP and the average number of PIPs was 2.5 (1.4) per patient.

Data show that the drug classes with the highest percentage of PIPs out of all the prescriptions were antithrombotic agents (corresponding to 7.9%), drugs for acid disorders and drugs used for hypertension (6.6% and 3.5% respectively). Considering each drug class separately, antiepileptics, benzodiazepines, Z-drugs and drugs for acid-related disorders were the most inappropriately prescribed, as reported in Table 6.

GPs added the diagnosed diseases to the CDSS for each patient; an analysis of the frequency of pathologies encountered was performed and the results are reported in Fig. 2. Hypertension was the most frequently occurring pathology (209 patients), followed by diabetes, dyslipidemia, heart disease and ulcer diseases.

The outcome of the reconciliation process was the ITS, including the identification of diseases and the list of daily drugs taken. The ITSs delivered by GPs to patients were elaborated thanks to the support of the DSTD; each ITS included data extrapolated from the CDSS and was shared and discussed by GPs and HPs in order to obtain the most favorable and reconciled therapy for each patient. ITSs provided: personal data (written by GPs), name of drugs (both brand and active substance), therapeutic indication, pharmaceutical form, dosage, indications on administration (e.g. full stomach, empty stomach, not in association with other drugs listed), time of administration for each dosage unit, indications on how to deal with forgotten dosage units and

Table 2
Demographic characteristics of the included patients.

Patient characteristics	Age (sd)*	Number of prescriptions n (sd)	Dosage units per day n (sd)	Concomitant diseases n (sd)	Score (sd)
Whole sample (n = 215)	76.4 (6.3)	8.1 (2.4)	9.8 (3.3)	5.5 (1.7)	24.5 (5.5)
Males (n = 118)	76.5 (6.3)	8.0 (2.4)	9.8 (3.3)	5.5 (1.7)	24.5 (5.5)
Females (n = 97)	76.3 (6.4)	8.1 (2.4)	9.7 (3.3)	5.4 (1.7)	24.5 (6.1)

*age: express as mean; sd: standard deviation.

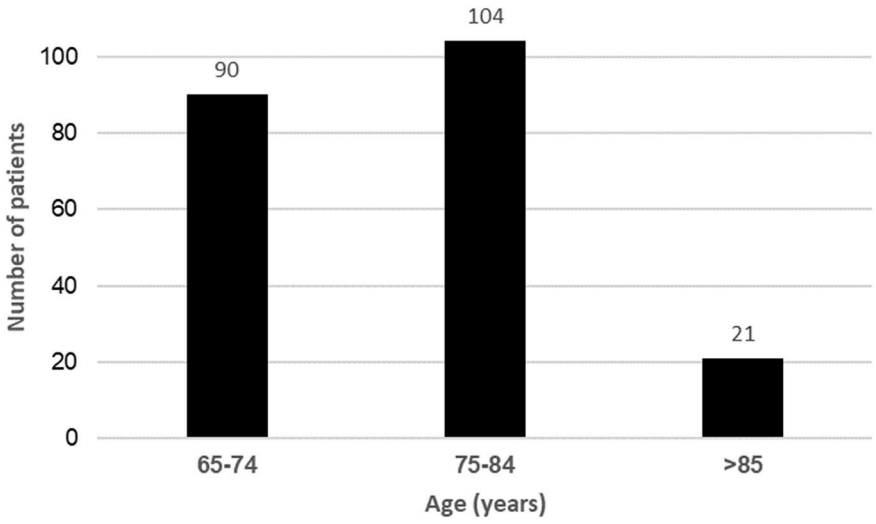

Fig. 1. Age stratification of the pool.

Table 4
Total prescriptions distribution according to ATC classes and age.

ATC code	Site of action	Number of prescriptions (%)	Age		
			65-74 n (%)	75-84 n (%)	>85 n (%)
C	Cardiovascular system	772 (39.1)	314 (40.7)	390 (50.5)	68 (8.8)
A	Alimentary tract and metabolism	535 (27.1)	225 (42.1)	257 (48.0)	53 (9.9)
B	Blood and blood forming organs	233 (11.8)	85 (36.5)	121 (51.9)	27 (11.6)
N	Nervous system	119 (6.0)	36 (30.3)	57 (47.9)	26 (21.8)
M	Musculoskeletal system	87 (4.4)	32 (36.8)	49 (56.3)	6 (6.9)
H	Systemic hormonal preparations (excluding sex hormones and insulins)	64 (3.2)	26 (40.6)	35 (54.7)	3 (4.7)
G	Genitourinary system and sex hormones	57 (2.9)	26 (45.6)	30 (52.6)	1 (1.8)
R	Respiratory system	57 (2.9)	21 (36.8)	32 (56.1)	4 (7.0)
S	Sensory organs	22 (1.1)	11 (50.0)	9 (40.9)	2 (9.1)
J	Anti-infective for systemic use	12 (0.6)	1 (8.3)	8 (66.7)	3 (25.0)
L	Antineoplastic and immunomodulating agents	11 (0.6)	3 (27.3)	7 (63.6)	1 (9.1)
D	Dermatological	4 (0.2)	3 (75.0)	1 (25.0)	0 (0.0)
P	Antiparasitic products, insecticides, and repellents	2 (0.1)	0 (0.0)	2 (100.0)	0 (0.0)
V	Various	1 (0.1)	1 (100.0)	0 (0.0)	0 (0.0)

Table 5
Top ten drugs prescribed.

ATC	Drug	No of patients (%)
B01AC06	Acetylsalicylic acid	111 (51.6)
A10BA02	Metformin	94 (43.7)
C10AA05	Atorvastatin	90 (41.9)
C03CA01	Furosemide	76 (35.3)
A02BC02	Pantoprazole	75 (34.9)
M04AA01	Allopurinol	57 (26.5)
A11CC05	Cholecalciferol	56 (26.0)
C09AA05	Ramipril	56 (26.0)
C07AB07	Bisoprolol	54 (25.1)
C08CA01	Amlodipine	40 (18.6)

precautions for administration.

The reconciliation pathway was focused on the DDIs encountered, the PIPs according to the Beers Criteria and administration issues that could influence patient compliance to therapy.

Table 7 shows the ten most common DDIs encountered among the contraindicated and major DDIs, according to the Micromedex® classification.

Four hundred and forty-nine DDIs were detected by the CDSS. The most frequent type of DDI was major interactions (440), which are defined as potentially harmful and could lead to ADRs. The remaining 9 DDIs were contraindicated interactions and should be changed promptly. For the purpose of this study, moderate and minor interactions were not considered.

The average number of DDIs per patient was 2.1 (1.8); 39 patients did not display any DDIs, while three presented 14, 10 and 8 major DDIs respectively. Aspirin-metformin, aspirin-furosemide and allopurinol-warfarin were the most frequent interactions found in the pool studied. 12.9% of the total interactions (52 major and 6 contraindicated) were solved through the process of review and reconciliation that was carried out in the extensive collaboration between GPs, HPs and the DSTD researchers.

A univariate logistic regression analysis was carried out to identify variables that were dependently associated with PIPs. It was found that older age, number of daily drugs taken and DDIs were positively associated with PIPs (*p-values* respectively: 0.047, <0.001, <0.001), confirming the close association between a higher number of drugs and inappropriate prescriptions, which has been extensively reported in the literature.[33–35]

GPs were asked to evaluate their level of satisfaction of attending the CME, focusing on: selection method used, inter-disciplinary approach, use of the Infologic CDSS and patient response to the proposed program. Except for some technical difficulties encountered in the use of the IT-tool, the remaining responses showed positive outcomes (between 80% and 100%). Moreover, questionnaires were administrated to a random sample of patients on their level of satisfaction with the ITS. Specifically, patients were asked whether the ITS was used daily, was straightforward and consulted as a means of communication between

Table 6
PIPs of the patients included in the study, according to the Beers Criteria

		Age					
		65-74		75-84		> 85	
Drug class	Total number of PIPs (%)[a]	Number of patients(%)[b] N = 215	Number of PIPs (%)[c] N = 1976	Number of patients(%)[b] N = 215	Number of PIPs (%)[c] N = 1976	Number of patients(%)[b] N = 215	Number of PIPs (%)[c] N = 1976
Drugs for acid-related disorders	131 (91.6)	47 (21.9)	50 (2.5)	61 (28.4)	61 (3.1)	17 (7.9)	20 (1.0)
Drugs used in diabetes	14 (4.9)	5 (2.3)	5 (0.3)	8 (3.7)	9 (0.5)	0	0 (0.0)
Antithrombotic agents	157 (78.1)	62 (28.8)	65 (3.3)	64 (29.8)	72 (3.6)	16 (7.4)	20 (1.0)
Cardiac therapy	15 (28.3)	2 (0.9)	2 (0.1)	11 (5.1)	12 (0.6)	1 (0.5)	1 (0.1)
Drugs used in hypertension	69 (12.6)	18 (8.4)	36 (1.8)	14 (6.5)	28 (1.4)	3 (1.4)	5 (0.3)
Antibacterial drugs for systemic use	2 (20.0)	0	0 (0.0)	1 (0.5)	2 (0.1)	0	0 (0.0)
Anti-inflammatory and antirheumatic drugs	8 (72.7)	2 (0.9)	2 (0.1)	5 (2.3)	5 (0.3)	1 (0.5)	1 (0.1)
CNS							
Analgesic drugs	6 (26.1)	0	0 (0.0)	2 (0.9)	4 (0.2)	1 (0.5)	2 (0.1)
Antiepileptic drugs	22 (100.0)	7 (3.3)	7 (0.4)	10 (4.7)	10 (0.5)	5 (2.3)	5 (0.3)
Antipsychotic drugs	3 (42.9)	0	0 (0.9)	1 (0.5)	3 (0.2)	0	0 (0.0)
Benzodiazepines	10 (100.0)*	4 (1.9)	6 (0.3)	3 (1.4)	3 (0.2)	1 (0.5)	1 (0.1)
Nonbenzodiazepine hypnotics	9 (100.0)*	1 (0.5)	3 (0.2)	1 (0.5)	3 (0.2)	1 (0.5)	3 (0.2)
Antidepressant drugs	23 (52.3)	3 (1.4)	9 (0.5)	8 (3.7)	13 (0.7)	1 (0.5)	1 (0.1)

[a] Total number of PIPs, referring to the specific drug classes (percentages, referring to the specific drug classes)
[b] Percentages refer to the total number of patients included
[c] Percentages refer to total prescriptions
* In the Beers Criteria, one active substance can be considered inappropriate for a number of different reasons, which explains the differences in the number of patients and the number of related PIPs. In the pool studied, the benzodiazepines and Z-drugs were prescribed to 11 patients, corresponding to 19 PIPs.

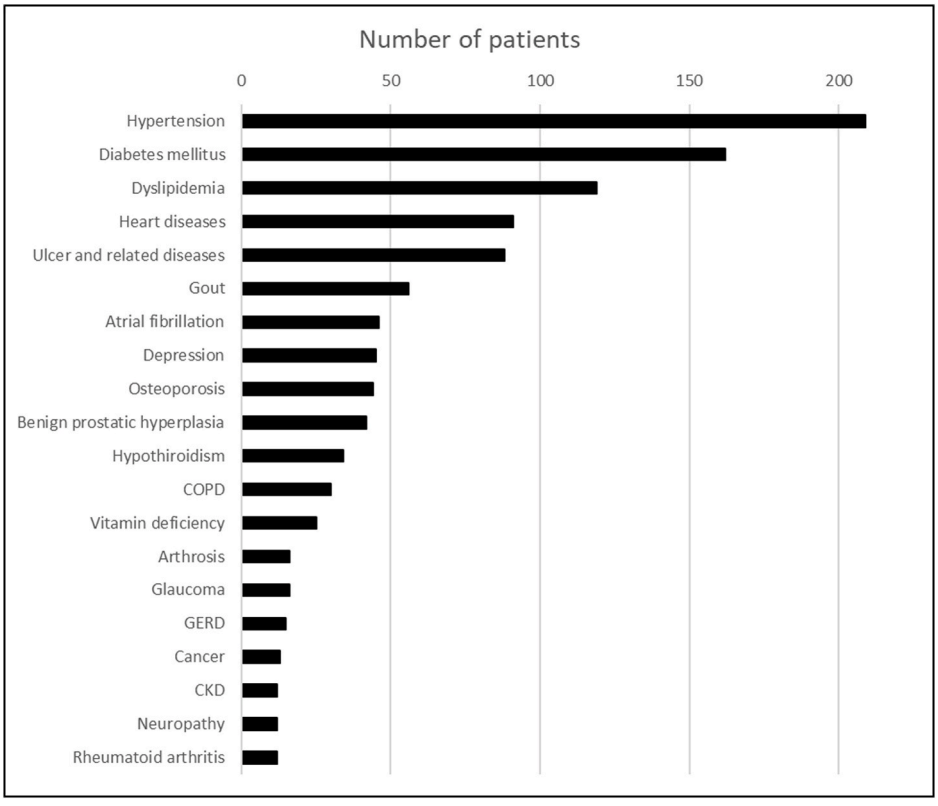

Fig. 2. Frequency of pathologies in the pool.

different health professionals. The most representative results emerged from the appreciation of the ITS tool (71.4% of favorable replies) and from the tight collaboration between patients and GPs.

Discussion

The CME was organized for a limited number of GPs since the proposed intervention was intended as an in-depth analysis of the topic of an inter-disciplinary approach on reconciliation.

The phenomenon of GPs dropping out of the CME was not totally

Table 7
Most frequent drug-drug interactions.

Drug interaction	Number of patients
Aspirin-metformin	54
Aspirin-furosemide	33
Allopurinol-warfarin	10
Aspirin-ramipril	8
Amiodarone-warfarin	7
Aspirin-citalopram	6
Aspirin-clopidogrel	6
Aspirin-ramipril/hydrochlorothiazide	6
Aspirin-repaglinide	6
Aspirin-torsemide	6

expected at the start. This can be explained by the proposed program being intense, but also by the personal characteristics of the GPs, who found the CDSS inconvenient to use as additional prescribing software. This could also explain the reduced number of patients enrolled by each GP.

From a pilot study that was conducted, 5 GPs contributed to determining patient-selection criteria, focusing on concurrent diseases such as diabetes, hypertension, coagulation problems and depression.Validated scores were taken into consideration but then excluded for two main reasons.[36,37] Firstly, the study was based on the GPs' personal knowledge of their patients and on the perceived difficulties of using guidelines when dealing with multiple morbidities. Secondly, no other score focuses on the drug classes, identified through ATC codes, that were considered for this study: for instance, the Charlson Comorbidity Index (CCI) and the Medicines Comorbidity Index (MCI) contain a number of pathologies that were not included in our selection and did not include depression as a marking disease.[36,37]

The collaboration between pharmacists from the DSTD and the Territorial Centre was extremely fruitful and appreciated by both sets of professionals. It also integrated practical and theoretical skills that were found to be beneficial for the development of the CDSS. Moreover, the GPs evaluated the inter-disciplinary approach to their patients' therapy as being surprisingly successful.

The total number of PIPs in the pool was higher than in the published outcomes of other European studies (from 10.6% to 12.9% in community-dwelling patients).[30,31] The first consideration is that the analyzed sample does not correspond to an average sample of community-dwelling elderly patients. Secondly, the score was used by GPs to select most critical patients, from which 20 were selected. Furthermore, the use of different criteria (Beers and/or STOPP Criteria) for medication inappropriateness may explain the percentages obtained.

The prescription of antithrombotic agents shows the highest percentage of PIPs, followed by drugs for acid-related disorders and drugs used in hypertension. Those drug classes were also the most frequent in the pool. Moreover, each patient included in the study group presents an average number of 2 DDIs *per capita* and this can be explained by the high number of drugs taken by the sample. Total number of DDIs (448) reported also shows that the combinations of drugs usually prescribed by GPs are not favorable, and that only 12.9% of DDIs were solved, corresponding to 32 patient polytherapies.

In general, the limited number of changes in therapy can be ascribed to several reasons. Firstly, the diseases and pathological conditions of the included patients, which mostly suffered from non-communicable chronic diseases, were treated with long-term prescriptions that are not frequently re-examined. Secondly, as the study pool was over 65 years of age, difficulties may have been being encountered when modifications to the therapy were suggested. This factor was particularly true when prescriptions were added by physicians (cardiologists, pneumologists, etc.) that were not GPs. Patients usually consider specialists to be more reliable, even if they lack a holistic assessment of patient's conditions. Moreover, reluctance towards changes in therapy may also be due to the personal prescription patterns of GPs that have been formed from their professional experience. Lastly, following recommended guidelines for each disease separately may result in unfavorable combinations of medications, which can lead to unexpected DDIs.

Limitations

The experience of performing this CME to improve awareness on the topics presented in the study was positive, despite the approach being completely new for the regional setting, and the lower-than-expected number of actively involved GPs. The use of technology to support the reconciliation process uncovered the general assumption that it may waste time and be inconvenient for health professionals. However, from another perspective, the CDSS allowed three different actors in different settings to collaborate. The ITSs were elaborated manually by the pharmacists of the DSTD, who sent them to the HPs, and were given to patients by GPs. This process slowed the delivery of ITSs, but this issue will be overcome in the future, as ITSs will be directly generated by the CDSS.

Conclusion

The CME organized for a group of GPs by HPs, with the collaboration of the DSTD of the University of Turin, prompted an evaluation of the polytherapies of elderly patients in terms of appropriateness of drug prescription and plausible causes of non-adherence. The results obtained from the experience of GPs participation in an inter-disciplinary CME to improve the treatment of patients undergoing polytherapy are encouraging. The course was conducted using IT-support from Infologic, which showed how technology, when at the service of health professionals, can support the instant analysis of complex polytherapies by applying multiple criteria (2019 Beers Criteria) and/or valuable databases (Micromedex® database).

Further research is needed to support the inspiring results obtained about the collaboration between health professionals, improving the management of polytherapies, varying settings (i.e. the new Case della Salute developing on a national scale) and refining the medication reconciliation process to achieve higher polypharmacy standards.

CRediT authorship contribution statement

S. Traina: Formal analysis, Data curation, Writing - original draft, Writing - review & editing. **L.G. Armando:** Software, Formal analysis, Data curation, Writing - original draft, Writing - review & editing. **A. Diarassouba:** Investigation, Project administration. **R. Baroetto Parisi:** Investigation, Supervision. **M. Esiliato:** Investigation. **C. Rolando:** Investigation. **E. Remani:** Investigation. **P. de Cosmo:** Software. **C. Cena:** Conceptualization, Methodology, Writing - original draft, Writing - review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The author reports no conflicts of interest in this work.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.sapharm.2020.08.005.

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