Journal of Kerman University of Medical Sciences

JKMU

Journal of Kerman University of Medical Sciences, 2019; 26 (4): 320-329

Evaluation of Medicine Prescription Pattern in Orthopedic Outpatient Clinics of Kerman Province, Iran

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Received: 21 July, 2019 Accepted: 11 August, 2019

ARTICLE INFO

Article type:
Short Communication

Keywords:
Medicine prescription
Orthopedists
Outpatients
Kerman Province
Iran

Abstract

Background: This study was aimed to evaluate the orthopedists' prescription pattern for outpatients referred to private clinics in Kerman province, Iran.

Methods: In this study a total of 59,613 outpatients' prescriptions issued by orthopedists contracting with Iran Health insurance organization and Iran Social Security Organization from the 1st May 2014 to the 1st May 2015 were analyzed for mean number of drugs per prescription, route of administration, drug category, drug names and the most common prescribed drugs.

Results: Mean number of drugs per prescription was 2.48. Non-steroidal anti-inflammatory drugs (NSAIDs) were the most frequently prescribed drugs (60.34%) followed by vitamins & minerals (53.88%), skeletal muscle relaxants (33.18%) and corticosteroids (33.0 %). Naproxen 250mg (14.29%) and diclofenac 100mg (7.5%) were the most frequently prescribed NSAIDs. Vitamin D_3 (injection & oral soft gelatin capsule) was the most frequently prescribed vitamin & mineral (24.72%). Gabapentin 300mg (12.73%) and methocarbamol 500 mg (10.59%) were the most frequently prescribed skeletal muscle relaxants. Methylprednisolone acetate (10.48%) and triamcinolone acetonide (7.45%) were the most frequently prescribed corticosteroids. Anti-ulcer drugs were prescribed only for 4.11% of outpatients.

Conclusion: NSAIDs, vitamins & minerals and corticosteroids were the most frequent prescribed drugs by orthopedists in Iran. The high rate of vitamin D_3 and calcium prescription is a valuable finding for the prevention and treatment of osteoporosis; however, anti-ulcer drugs were prescribed lower than the requiered rate and this was a remarkable finding which increases the risk of NSAIDs /corticosteroids- induced gastropathies. Therefore, some interventions for improving drug prescription by orthopedists are suggested.

Citation: Sepehri GH.R, Ebrahimi-Meimand Z. Evaluation of Medicine Prescription Pattern in Orthopedic Outpatient Clinics of Kerman Province, Iran. *Journal of Kerman University of Medical Sciences*, 2019; 26 (4): 320-329.

Introduction

The research on prescription pattern and drug utilization is an essential part of pharmaco-epidemiology field which provide the basic data for most commonly used drugs, toxicity risks, national drug planning and the cost of treatment. These data can be used for evaluating and if necessary, suggesting modifications in prescribing practices of medical practitioners (1, 2).

Irrational drug prescriptions have been reported in both developing and developed countries (3-5).

Inappropriate drug prescription is frequent among older patients with an important impact on health-related outcomes (3, 6, 7). Non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroids are the most frequently prescribed drugs by orthopedists followed by minerals & vitamins, gastrointestinal (GI) drugs, antibacterial drugs, skeletal muscle relaxants & antithrombotic drugs (8-10). Osteoarthritis and low back pain are among the most common prevalent diseases treated at orthopedic clinics (11).

There is a significant difference in the prescription pattern of oral NSAIDs and intra-articular hyaluronic acid injections or oral and intra-articular injections of corticosteroids (12) for low back pain and osteoarthritis among orthopedists in different parts of the world (8, 9, 13). For example celecoxib was the most common NSAIDs prescribed in Korea, whereas diclofenac was common NSAIDs prescribed in Nepal and Iran (9, 14-16). Oral prednisolone was the most common prescribed corticosteroid for the treatment of musculoskeletal disorders in Texas , USA, but methylprednisolone acetate was the most common prescribed corticosteroid in Iran (8, 17)

Since there is no reliable report on the prescribing habits of orthopedists in Iran, this study was aimed to evaluate the prescribing practice of orthopedists in outpatients referred to private orthopedic clinics in Kerman province, Iran.

Materials and Methods

This retrospective cross-sectional study was carried out over a one-year period from 1st May 2014 to 1st May 2015. A total of 59,613 prescriptions of orthopedic outpatients were randomly selected from two Iranian public insurance organizations including Health Insurance Organization (an Iranian public insurance organization) and Social Security Organization (SSO) Insurance, in Kerman Province, Iran, with at least 100 prescriptions per orthopedists. Kerman province is situated 1,000 km from Tehran in south of Iran. Social Security Organization (SSO) Insurance is a social insurance organization in Iran which covers workers and employees in the private sector as well as volunteer self-employed persons. Iran Health Insurance Organization covers a wide range of individuals in the community, including government employees and individuals of various socioeconomic levels who are not eligible to be covered by other insurance organizations. Prescriptions with at least one medication that had been issued to patients of all ages and both genders were included in the study. Drug-related information including the drug name, dose, dosage form and route of administration were recorded on standard prescription forms and the mean number of drugs per prescription, drug category, the percentage of prescription of each drug and the percentage of the most common prescribed and used drugs were calculated.

The total number of the prescribed drugs was calculated as:

Total number of prescribed drugs = mean number of drugs per prescription × total prescriptions

The percentage of prescription of each individual drug was calculated as:

$$\text{The percentage of prescription of each drug} = \frac{\text{Total Number of each drug prescribed}}{\text{Total number of all prescribed drugs}(147840)} \times 100$$

Approval to use the data was taken from Kerman University of Medical Sciences Ethic Committee (K/93/413).

Results

A total of 59,613 orthopedic outpatient prescriptions were analyzed for using some WHO drug use indicators (18). Overall, the mean number of drugs per prescription was 2.48 (ranging from 1-9). A total of 147840 drugs were prescribed by orthopedic outpatients during the study period.

The majority of prescriptions (94%) had complete documentation regarding the drug information (drug name, dose, dosage forms and route of administration). Most of the prescriptions (90%) had been prescribed by generic names of drugs. Only 32.5% of the drugs had been prescribed in oral form and injectable drugs had been prescribed in 55% of the prescriptions.

NSAIDs were the most frequently prescribed drugs (60.34%) followed by vitamins & minerals (53.88%), skeletal muscle relaxants (33.18%), corticosteroids (33.0 %), antibacterial drugs (11.0%) and GI drugs (4.11%). Antithrombotic drugs were prescribed only in 0.32% of outpatients and 15.49% of patients received other drugs such as anabolic steroids, supplements and others (Table1).

Table 1. Prescription patterns of the most commonly prescribed drug categories for orthopedic outpatients in Kerman Province, Iran

Drug category	Patients receiving drugs (%)*	Drug used %*
NSAIDs	60.34	26.8*
Vitamins & minerals	53.88	22.69*
Skeletal muscle relaxants	33.18	18.44
Corticosteroids	33.0	19.33*
Antibacterials	11.0	4.37
GI drugs	4.11	1.12
Anti-thrombotic	0.32	0.12
Others (anabolic steroids, supplements…)	15.49	7.16

*: Patients may receive more than one drug category in each prescription.

NSAIDs: Non-steroidal anti-inflammatory drugs, GI: gastrointestinal

Table 2 shows the most frequently prescribed drugs and the percentage of each drug prescription in each drug category. Naproxen 250mg Tab (14.29%), diclofenac 100mg Tab (7.5%), piroxicam 0.5% gel (7.49%), naproxen 500mg Tab (5.84%) and ibuprofen 400mg Tab (5.8%), were the most frequently prescribed NSAIDs for orthopedic outpatients. Totally, 24.72% of patients received vitamin D_3 (Vitamin D_3 injection: 18.25 % and soft gelatin capsule: 6.47%) as the most frequently prescribed drug among vitamins & minerals, followed by vitamin $B_1$300mg Tab (11.11%), calcium-D Tab (9.38%) and vitamin $B_1$100mg Tab (8.76%). Gabapentin 100 mg Cap (12.73%) and methocarbamol 500 mg Tab (10.59%) were the most frequently prescribed skeletal muscle relaxants (Table 2).

In 29.07% of patients, the injection form of corticosteroids had been prescribed and methylprednisolone acetate (10.48%), triamcinolone acetonide (7.45%), betamethasone LA (5.81%) and dexamethasone 8mg (5.33%) were the most frequently prescribed corticosteroids. Omeprazole 20mg Cap (2.4%) was the most frequently prescribed GI drug and cephalexin 500mg Cap (4.21%) and ciprofloxacin 500mg Tab (4.02%) were the most frequently prescribed anti-bacterial drugs (Table 2).

Table 2. Prescription patterns of the most commonly prescribed individual drugs in each selected drug categories for the orthopedics outpatients in Kerman Province, Iran

Drug category	Dosage form	Patients receiving drugs (%)	Drug used %
NSAIDs			
Naproxen 250mg	Tab	14.29	5.48
Diclofenac 100mg	Tab	7.5	3.00
Naproxen 500mg	Tab	5.84	2.33
Ibuprofen 400mg	Tab	5.8	2.31
Vitamin& Minerals			
Vitamin D_3		24.72	10.2
Injection	Injection	18.25	7.54
Oral	Soft Gelatin Capsule	6.47	2.66
Vitamin B_1 300mg	Tab	11.11	4.56
Calcium-D *	Tab	9.38	3.8
Vitamin B_1 100mg		8.67	3.51
Corticosteroids			
Methylprednisolone acetate	Injection	10.48	3.62
Triamcinolone acetonide			
Betamethasone LA	Injection	7.45	3.57
Dexamethasone 8mg	Injection	5.81	2.79
	Injection	5.33	2.12
Antibacterials			
Cephalexin 500mg	Cap	4.21	1.68
Ciprofloxacin 500mg	Tab	4.02	1.60
Cefixime 400mg	Tab	1.43	0.57
Clindamycin 150 mg	Cap	0.83	0.33
Skeletal Muscle Relaxants			
Gabapentin 100mg	Tab	12.73	5.22
Methocarbamol 500mg	Tab	10.59	4.34
GI drugs			
Omeprazole 20mg	Cap	2.4	0.96
Famotidine 40mg	Tab	1.3	0.52
Antithrombotics			
Enoxaparin	Injection	0.32	0.01

*: Calcium-D; Calcium 500 mg + Vitamin D_3 200 IU
NSAIDs: Non-steroidal anti-inflammatory drugs, LA: long acting, GI= gastrointestinal

As it is seen in table 3, Vitamin D_3 (injection & soft gelatin capsule) was the most frequently prescribed drug (24.72%) by orthopedists followed by naproxen 250mg Tab (14.29%), gabapentin 100 mg Cap (12.73%) and vitamin B_1 300mg Tab (11.11%).

Table 3. The ten most prescribed and used drugs by orthopedists in orthopedics outpatients in Kerman Province, Iran

Drug	Dosage form	Patients receiving drugs (%)	Drug used %
Vitamin D_3	Injection	24.72	10.2
Naproxen 250mg	Tab	14.29	5.48
Gabapentin 100 mg	Cap	12.73	4.74
Vitamin B_1 300mg	Tab	11.11	4.56
Methocarbamol 500mg	Tab	10.59	5.22
Methylprednisolone acetate	Injection	10.48	3.62
Calcium-D*	Tab	9.38	3.8
Diclofenac 100mg	Tab	7.5	3.0
Triamcinolone acetonide	Injection	7.45	3.57
Piroxicam 0.5% gel	Gel	7.49	2.98
Betamethasone LA	Injection	5.81	2.79

*: Calcium-D; Calcium 500 mg + Vitamin D_3 200 IU, LA: long acting

Discussion

The main purpose of this study was to understand and present the orthopedists' prescription pattern in private offices of Kerman Province, Iran.

Indicators of appropriate drug prescription have a central place in evaluating the performance of health professionals and the mean number of drugs per prescription is an important index of rational prescription (19). In the present study, mean number of drugs per prescription was 2.48 which is almost similar to that reported for orthopedists practicing in Isfahan, Iran (2.51), but it is higher than that reported in Nepal (1.9) and India (2) (17, 20, 21) .

According to our results, NSAIDs were the most frequently prescribed drugs by orthopedists which is similar to the results of studies in Nepal (59.9%) and India (64.14%), but it is much more frequent than that reported for orthopedists in Isfahan, Iran (23.2%) (16, 20, 21).

Naproxen was the most frequently prescribed NSAIDs drugs in the present study; however, in Isfahan study, diclofenac was the most common NSAID prescribed by orthopedists (16). Celecoxib, diclofenac and rofecoxib were the most commonly prescribed NSAIDs in Korea, Nepal and India, respectively (9, 15, 21). Loxoprofen sodium, diclofenac sodium, and etodolac were the most frequently prescribed NSAIDs by orthopedists in Japan (22).

Our results showed that vitamins & minerals (53.88%) were the 2nd most frequently prescribed drugs for orthopedic outpatients and vitamin D_3 (injection & soft gelatin capsule) was prescribed for 24.72% of patients which is in complete agreement with Karimi et al (2014) report in Iran (17), but much higher than the rate has been reported in similar studies

in Nepal (8.5%) and India (9.09%) (20, 21). Also, in our study, calcium –D tablet had been prescribed for about 9.38% of patients. The high rate of mineral and vitamin prescription in our study is an outstanding finding and could be valuable in the prevention and treatment of osteoporosis. Osteoporosis has a significant role in patients' morbidity and mortality, due to hip fracture, fragility fractures, and functional and mortality consequences of a second hip fracture, as well as in medical resources and treatment costs; therefore, initiation of calcium and vitamin D treatment for the prevention of osteoporosis is highly recommended (23, 24). According to a study, calcium and vitamin D_3 were prescribed only in 41 percent of patients after hip fracture in a hospital in Germany (24). According to a study on patients with hip fracture in the USA between 2002 to 2011, osteoporosis medication use had not been satisfactory and most patients suffering hip fracture, had not received osteoporosis medication in the subsequent years (25).

In the present study, corticosteroids had been prescribed in 33.0 % of prescriptions. Our results are comparable with similar reports in Iran (16, 17). There were few valid researches on the pattern and type of corticosteroids prescribed for orthopedic outpatients. Although corticosteroids are potent inhibitors of inflammation, widespread use of corticosteroids may leads to many toxic effects (26). Malpractices in corticosteroids administration have been reported even in the developed countries like USA (27).

In our knowledge, there is no precise estimates for complication rates following the therapeutic use of injected or systemic corticosteroids treatment in orthopedic outpatients; therefore, orthopedists should have knowledge of risks related to glucocorticoid use and their cost- benefit effects and be familiar with guidelines to manage them (28). Most of the Italian orthopedic surgeons (94%) used disease-modifying osteoarthritis drugs (DMOADs) for symptomatic osteoarthritis treatment (29). However, There are relatively poor evidence for pain reduction efficacy of intra-articular steroid hip injection (IASHI) and large trials are required to verify the beneficial effects of intra-articular corticosteroids and duration of their efficacy (30).

In our study, methylprednisolone acetate (10.48%) and triamcinolone acetonide (7.45%) were the most frequently prescribed corticosteroids. This finding is comparable to the results of a similar study in Iran (17). Prednisone was the corticosteroid prescribed by 82% of physicians for musculoskeletal injuries in USA (8), but others prescribed betamethasone sodium phosphate and betamethasone acetate (31). Despite the widespread use of steroid injections in clinical practice, the rationale for these injection practices is not evidence- based on a scientific reference and most of the orthopedists in developed countries such as USA, reported no specific rationale for their practice or attributed it to their experience obtained during fellowship or colleagues use /advise (31).

The prescription rate of skeletal muscle relaxants (spasmolytic drugs) in our study is much higher than that in orthopedic outpatients of India & Nepal (20, 21). Spasticity is a common disorder among people suffering from stroke, multiple sclerosis, ankylosing spondylitis, traumatic brain and spinal cord injuries (32). Our results showed that gabapentin 100 mg tab had been the most frequently prescribed skeletal muscle relaxants (12.73%) followed by methocarbamol 500mg tab (10.59%), which is an interesting finding. Although gabapentin have been used for the treatment of spasticity for several decades, evidence for its efficacy is poor and the

gabapentin dosage form (100 mg tab) does not seem to possess anti-spasticity efficacy as well (32). However, gabapentin is proposed as the first-line treatment in neuropathic pain (33). Since diagnosis is not included in our study, it is not clear whether gabapentin had been prescribed as a spasmolytic or for the treatment of neuropathic pain. To the best of our knowledge, there is no valid data representing the gabapentin prescription rate for spasticity and other musculoskeletal injuries treatment. Also, there is fair evidence regarding the effectiveness of methocarbamol compared to placebo in patients with spasticity and musculoskeletal conditions (34).

The low prescription rate of anti-ulcer drugs (4.11%) was unpredictable and very lower than the required rate. This finding is interestingly remarkable, since it may result in the increased risk of drug- induced GI adverse effects. Despite the high rate of NSAIDs and corticosteroids prescription in this study, gastroprotective and anti-ulcer drugs prescription was too low to prevent drug induced gastropathies. The rate of anti-ulcer drugs prescription in our study is in agreement with the reported rate in Nepal, but it is remarkably less than that reported in India (20, 21).

Strong evidences support the association between NSAIDs and a considerable risk of peptic ulcer disease, dyspepsia, abdominal pain and sometimes life-threatening cases of GI bleeding and perforation (9, 35). Long-term use of NSAIDs (≥ 3 months) has been identified as the most prevalent GI risk factor (9). Also, corticosteroids consumption can result in gastric pain and peptic ulcer in treated patients (36).Therefore, prevention of corticosteroids/ NSAIDs-related gastropathies is an important clinical issue, and continuous therapeutic strategies for both the primary and secondary prevention of adverse events are of special importance. The reasons for low prescription rate of anti-ulcer drugs by orthopedists were not determined and needs further investigation, both in regard to the prevalence of GI adverse effects and the strategies for the prevention of drug- induced gastropathies (37). Other strategic efforts such as continuous medical education programs, promotion of treatment guideline protocols and use of an electronic drug information system is necessary to promote physician's drug prescribing behaviors.

Conclusion

NSAIDs, vitamins & minerals and corticosteroids were the most frequently prescribed drugs by orthopedists in private clinics in Kerman province, Iran. Vitamin D_3 was the most frequently prescribed drug (24.72%) followed by naproxen 250 mg tab and gabapentin 100 mg tab. The high rate of vitamin D_3 and calcium prescription is a valuable finding for the prevention and treatment of osteoporosis; however, gabapentin 100mg neither relieves neuropathic pain nor possesses spasmolytic effects. The low rate of anti-ulcer drugs prescription (4.11%) was a remarkable finding which increases the risk of NSAIDs / corticosteroids- induced peptic ulcer and GI bleeding and perforation. So that appropriate, effective and feasible strategies should be chosen to increase patient safety through rational drug prescription by all health professionals including orthopedists.

Limitations

This study has a few limitations. The prescriptions did not include the patient's main diagnosis or socioeconomic status. Also, in our study the duration of drug therapy and the rate of co-administration of 2 corticosteroids or NSAIDs or their combination use was not determined. Moreover, we studied the

prescription pattern of a limited number of orthopedists in Kerman province/ Iran who had contractions with the Iranian insurance Organizations. This might limit the prescription of drugs without insurance or prescriptions without enough insurance coverage or expensive drugs. So, further studies over a longer period of time and a greater number of patients are required to provide a baseline data of orthopedists prescription pattern in Iran.

Acknowledgements

This study was supported through a grant (93/363) by Vice Chancellor for Research, Kerman University of Medical Sciences, Kerman, Iran. The funding source had no role in the research process and manuscript publication.

References

1. Onder G, Landi F, Cesari M, Gambassi G, Carbonin P, Bernabei R, et al. Inappropriate medication use among hospitalized older adults in Italy: results from the Italian Group of Pharmacoepidemiology in the Elderly. Eur J Clin Pharmacol 2003; 59(2):157-62.
2. Wettermark B, Hammar N, Fored CM, Leimanis A, Otterblad Olausson P, Bergman U, et al. The new Swedish Prescribed Drug Register-opportunities for pharmacoepidemiological research and experience from the first six months. Pharmacoepidemiol Drug Saf 2007; 16(7):726-35.
3. Amann U, Schmedt N, Garbe E. Prescribing of potentially inappropriate medications for the elderly an analysis based on the PRISCUS list. Dtsch Arztebl Int 2012; 109(5):69-75.
4. Holt S, Schmiedl S, Thürmann PA. Potentially inappropriate medications in the elderly: the PRISCUS list. Dtsch Arztebl Int 2010; 107(31-32):543-51.
5. Kaufmann CP, Tremp R, Hersberger KE, Lampert ML. Inappropriate prescribing: a systematic overview of published assessment tools. Eur J Clin Pharmacol 2014; 70(1):1-11.
6. Hanlon JT, Schmader KE, Boult C, Artz MB, Gross CR, Fillenbaum GG, et al. Use of inappropriate prescription drugs by older people. J Am Geriatr Soc 2002; 50(1):26-34.
7. Miquel MD, Cuervo MS, Silveira ED, Machuca IS, González-Blazquez S, Errasquin BM, et al. Potentially inappropriate drug prescription in older subjects across health care settings. Eur Geriatr Med 2010; 1(1):9-14.
8. Harmon KG, Hawley C. Physician prescribing patterns of oral corticosteroids for musculoskeletal injuries. J Am Board Fam Pract 2003; 16(3):209-12.
9. Lee SH, Han CD, Yang IH, Ha CW. Prescription pattern of NSAIDs and the prevalence of NSAID-induced gastrointestinal risk factors of orthopaedic patients in clinical practice in Korea. J Korean Med Sci 2011; 26(4):561-7.
10. Mesko JW, Brand RA, Iorio R, Gradisar I, Heekin R, Leighton R, et al. Venous thromboembolic disease management patterns in total hip arthroplasty and total knee arthroplasty patients: a survey of the AAHKS membership. J Arthroplasty 2001; 16(6):679-88.
11. Kalichman L, Li L, Kim DH, Guermazi A, Berkin V, O'Donnell CJ, et al. Facet joint osteoarthritis and low back pain in the community-based

population. Spine (Phila Pa 1976) 2008; 33(23):2560-5.

12. Ahmadizar F, Soleymani F, Abdollahi M. Study of drug-drug interactions in prescriptions of general practitioners and specialists in Iran 2007-2009. Iran J Pharm Res 2011; 10(4):921-31.
13. Leopold SS, Redd BB, Warme WJ, Wehrle PA, Pettis PD, Shott S. Corticosteroid compared with hyaluronic acid injections for the treatment of osteoarthritis of the knee. A prospective, randomized trial. J Bone Joint Surg Am 2003; 85(7):1197-203.
14. Das BP, Adhikari N, Garg M, Rauniar GP, Naga Rani MA. Utilization pattern of nonsteroidal anti-inflammatory drugs (NSAIDs) in orthopaedic practice at a tertiary care hospital in eastern Nepal. JNMA J Nepal Med Assoc 2000; 39:315-18.
15. Gupta M, Malhotra S, Jain S, Aggarwal A, Pandhi P. Pattern of prescription of non-steroidal antiinflammatory drugs in orthopaedic outpatient clinic of a north Indian tertiary care hospital. Indian J Pharmacol 2005; 37(6):404-5.
16. Sadeghian GH, Safaeian L, Mahdanian AR, Salami S, Kebriaee-Zadeh J. Prescribing quality in medical specialists in isfahan, iran. Iran J Pharm Res 2013; 12(1):235-41.
17. Karimi A, Haerizadeh M, Soleymani F, Haerizadeh M, Taheri F. Evaluation of medicine prescription pattern using World Health Organization prescribing indicators in Iran: a cross-sectional study. J Res Pharm Pract 2014; 3(2):39-45.
18. World Health Organization. How to Investigate Drug Use in Health Facilities: Selected drug use indicators.[cited ????????] Available from: http://apps.who.int/medicinedocs/en/d/Js2289e/
19. Hogerzeil HV. Promoting rational prescribing: an international perspective. Br J Clin Pharmacol 1995; 39(1):1-6.
20. Banerjee I, Bhadury T, Agarwal M. Prescribing pattern in orthopedics outpatient department of a medical college in India. Int J Basic Clin Pharmacol 2015; 4(6):1175-7.
21. Shankar P, Pai R, Dubey Ak, Upadhyay Dk. Prescribing patterns in the orthopaedics outpatient department in a teaching hospital in Pokhara, western Nepal. Kathmandu Univ Med J (KUMJ) 2006; 5(1):16-21.
22. Tsumura H, Tamura I, Tanaka H, Chinzei R, Ishida T, Masuda A, et al. Prescription of nonsteroidal anti-inflammatory drugs and co-prescribed drugs for mucosal protection: analysis of the present status based on questionnaires obtained from orthopedists in Japan. Intern Med J 2007; 46(13):927-31.
23. Pearse EO, Redfern DJ, Sinha M, Edge AJ. Outcome following a second hip fracture. Injury 2003; 34(7):518-21.
24. Crilly RG, Speechley M, Overend TJ, Mackenzie R, Simon S, Cremer S. Evaluation of a care pathway in the initiation of calcium and vitamin D treatment of patients after hip fracture. Can J Aging 2009; 28(01):21-6.
25. Solomon DH, Johnston SS, Boytsov NN, McMorrow D, Lane JM, Krohn KD. Osteoporosis medication use after hip fracture in US patients between 2002 and 2011. J Bone Miner Res 2014; 29(9):1929-37.
26. Cranney A, Adachi JD. Corticosteroid-induced osteoporosis: a guide to optimum management. Treat Endocrinol 2002; 1(5):271-9.

27. Nash JJ, Nash AG, Leach ME, Poetker DM. Medical malpractice and corticosteroid use. Otolaryngol Head Neck Surg 2011; 144(1):10-5.

28. Moghadam-Kia S, Werth VP. Prevention and treatment of systemic glucocorticoid side effects. Int J Dermatol 2010; 49(3):239-48.

29. Scarpa R, Sarzi-Puttini P, Cimmino MA, Caporali R, Parazzini F, Zaninelli A, et al. Analysis of pharmacologic and nonpharmacologic prescription patterns of general practitioners and specialists in the AMICA study. Semin Arthritis Rheum 2005; 35(1 Suppl 1):24-30.

30. McCabe PS, Maricar N, Parkes MJ, Felson DT, O'Neill TW. The efficacy of intra-articular steroids in hip osteoarthritis: a systematic review. Osteoarthritis Cartilage 2016; 24(9):1509-17.

31. Kegel G, Marshall A, Barron OA, Catalano LW, Glickel SZ, Kuhn M. Steroid injections in the upper extremity: experienced clinical opinion versus evidence-based practices. Orthopedics 2013; 36(9):e1141-8.

32. Nair KP, Marsden J. The management of spasticity in adults. BMJ 2014; 349:g4737.

33. Finnerup NB, Attal N, Haroutounian S, McNicol E, Baron R, Dworkin RH, et al. Pharmacotherapy for neuropathic pain in adults: a systematic review and meta-analysis. Lancet Neurol 2015; 14(2):162-73.

34. Chou R, Peterson K, Helfand M. Comparative efficacy and safety of skeletal muscle relaxants for spasticity and musculoskeletal conditions: a systematic review. J Pain Symptom Manage 2004; 28(2):140-75.

35. Schlansky B, Hwang JH. Prevention of nonsteroidal anti-inflammatory drug-induced gastropathy. J Gastroenterol 2009; 44(Suppl 19):44-52.

36. Richardus JH, Withington SG, Anderson AM, Croft RP, Nicholls PG, Van Brakel WH, et al. Adverse events of standardized regimens of corticosteroids for prophylaxis and treatment of nerve function impairment in leprosy: results from theTRIPOD'trials. Lepr Rev 2003; 74(4):319-27.

37. Lanas A, Polo-Tomás M, Roncales P, Gonzalez MA, Zapardiel J. Prescription of and adherence to non-steroidal anti-inflammatory drugs and gastroprotective agents in at-risk gastrointestinal patients. Am J Gastroenterol 2012; 107(5):707-14.