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ORIGINAL ARTICLE

# Prescription practices of anti-osteoporosis medication among Thai orthopedic surgeons (PAMOS study) in osteoporotic hip fracture

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## Abstract

**Summary** As a medication for preventing osteoporotic fracture is recommended but scarcely prescribed, this study surveyed Thai orthopedic surgeons to explore key determinants of their prescription practices. In addition to a set of well-known determinants, the patient's health insurance status could also influence the prescription practice.

**Purpose** Although many guidelines suggest using anti-osteoporosis medications in patients who suffered from fragility hip fractures, low rate of prescription was encountered all over the world. In this study, we aimed to explore potential determinants affecting the prescription of anti-osteoporosis medications by orthopedic surgeons.

**Materials and methods** Online questionnaire survey was conducted among randomly selected orthopedic surgeons in Thailand. We inquired the factors associated with anti-osteoporosis medication prescription (likely to prescribe, unlikely to prescribe, or not influential). The reasons for not prescribing were also inquired.

**Results** Two hundred and ninety-four participants responded to the questionnaires. Age, gender, previous fragility fracture, and BMD results seemed to influence the medication prescription. Interestingly, the type of reimbursement was responded as an important factor. The leading reason for not prescribing the medication was due to the high cost of the treatment.

**Conclusions** Knowing the factors affecting the prescription of anti-osteoporosis medication is beneficial for strategic planning in order to increase the rate of prescription. The gap of treatment may be reduced, and the morbidity and mortality of the patients can be decreased.

**Keywords** Osteoporosis · Anti-osteoporosis medications · Bisphosphonate · Opinion · Factor

## Introduction

In Thailand, the treatment recommendation for anti-osteoporosis medications was launched by Thai Osteoporosis Foundation (TOPF) since 2010 and was updated in 2016. Pharmacological treatment of osteoporosis is indicated in hip fracture from low-energy injuries in menopausal women and men aged over 50 years [1]. Unfortunately, even though many guidelines suggest using anti-osteoporosis medications in patients with osteoporotic hip fracture, many studies report a relatively low rate of prescription [2–7]. Thorough understanding of the phenomenon may enhance the rate of pharmacological treatment resulting in the prevention of the second fracture and decreasing in mortality rate. Even many pieces of literature investigated the influential factors in anti-osteoporosis medications prescription in osteoporotic fragility fracture [8–12], there are few studies focusing on osteoporotic hip fracture. A number of clinical determinants affecting the absence of medications including age, gender, previous fragility fracture, and BMD measurement were identified but data on non-clinical factors such as health insurance status that may affect the anti-osteoporosis medication received and lead to a low rate of prescription have been limited. This study aimed to evaluate the opinion of orthopedic surgeons in terms of anti-osteoporosis medication prescription in patients with osteoporotic hip fractures.

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## Methods

The online survey questionnaire has three parts. Part 1 is a physicians' characteristics consisting of gender, age, the status of work (orthopedic surgeons in training or in practice), type of affiliation (public hospital with/without residency training, private hospital), and geographic regions. Part 2 is a question of the patients' characteristic factors which may affect the anti-osteoporosis medication prescription consisting of age, gender, comorbidity, steroid use, previous fragility fracture, BMD test, and ambulatory status. All of these factors were asked to participants whether these factors have a positive effect (likely to prescribe the medication) or negative (unlikely to prescribe) or not influential. The health insurance schemes included the universal coverage scheme, social security scheme, civil servant medical benefits scheme, and self-pay. Participants were asked which health insurance scheme is likely to receive the medication. The last part is relevant to real-world medical practice consisting of three questions: (1) "Who is responsible for medication prescription?" (multiple checkboxes and fill in the blank) (2) "How often do you prescribe medication? (Likert scale 1–10), and (3) "In case you do not prescribe, what are the reasons?" (multiple checkboxes and fill in the blank). Content validity of the questionnaire was done by using the index of item-objective congruence (IOC) by five orthopedic surgeons which all are specialized in osteoporosis management in orthopedics. All items had a score of more than 0.6. Given the 2300 orthopedic surgeons and 400 in-training orthopedic surgeons in Thailand as a finite population of 2700, a proportion of 0.50, error 0.05, alpha 0.05, a sample size of 337 was conservatively set as our goal. The questionnaire was sent via email to randomly selected orthopedic surgeons. Descriptive statistics were used as appropriate. The protocol of the study was approved by the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University. We used the consent by action method in order to obtain the inform consent.

## Results

Two hundred and ninety-four participants responded to the survey (response rate of 87.24%). Most of the participants were male (87.07%). The mean age was 33 years (range 25–57; SD 4.8). There were 174 (59.18%) participants currently working as orthopedic surgeons and 119 (40.48%) in-training in an orthopedic program along with one missing data. Most of the workplace are public hospitals which have an orthopedic training program (64.29%) followed by public hospitals with no training program (31.29%) and private hospitals (5.44%). The participants were from all the regions of Thailand, mostly from the Central region (37.07%) and Bangkok (26.19%), followed by Northeastern (11.90%), Southern (7.82%), Northern (7.48%), Eastern (7.14%), and Western (0.68%).

The result of the study in part 2 included the questions asked directly whether the factors have an impact on prescribing anti-osteoporosis medication or not. Age of the patients seems to have an effect on medication prescription. Seventy-seven percent of the participants agreed that older patients are likely to receive the medication. In contrast, 6% answered that the older age is unlikely to receive the medication and 17% responded that the age of the patient has no influence on the medication prescription. Regarding gender, most of the participants agreed that female patients are likely to receive the medication (72%) followed by not influential (26%) and unlikely to prescribe (1%). Underlying disease and ambulation status of the patients seem to have no effect on the medication prescription; there was a comparable result of a positive effect on medication prescription (43.7%), negative effect (32.5%), and not influential (23.7%). Ambulation status of the patients was regarded as not influential (44.7%) followed by likely to prescribe (34.6%) and unlikely to prescribe (20.7%). Steroid usage was regarded as a positive factor for medication prescription in 76%, a negative factor in 6% and not influential in 18% of the participants. Previous fragility fracture and BMD result of the patients were considered strongly influential for anti-osteoporosis medication prescription (95%).

Interestingly, the type of reimbursement seems to have an impact on anti-osteoporosis medication prescription. The leading health insurance scheme that the participants responded as likely to prescribe the medication was government (or state enterprise) scheme (79%) followed by self-pay (49%). Nineteen percent answered as no influence on medication prescription. The summary of part 2 results was demonstrated in Fig. 1 and the types of reimbursement was presented in Fig. 2.

In the last part of the questionnaire, we asked for the opinion of the participants. The first question was "responsible doctor to initiate anti-osteoporosis medication." The orthopedist was in the first place with 99% followed by the endocrinologist (69%), gynecologist (35%), and family medicine doctor (31%). More details and the other minor answers were shown in Fig. 3.

The next question, a 1–10 Likert scale of how frequent the prescription, was asked to the participants. The result varied from 1 to 10 points with a median of 7 points. Details of the result were showed in Fig. 4. When compared this scale between orthopedic surgeons in training or in practice as well as the workplaces, there was no significant difference in Likert scale of prescription of the anti-osteoporosis medication ($p$ = 0.61 and 0.64 respectively).

The last question was about the reason for not prescribing anti-osteoporosis medication. Interestingly, at least 74% of the respondents agreed that the cost of the treatment (too expensive or cannot be reimbursed) was one of the leading causes of

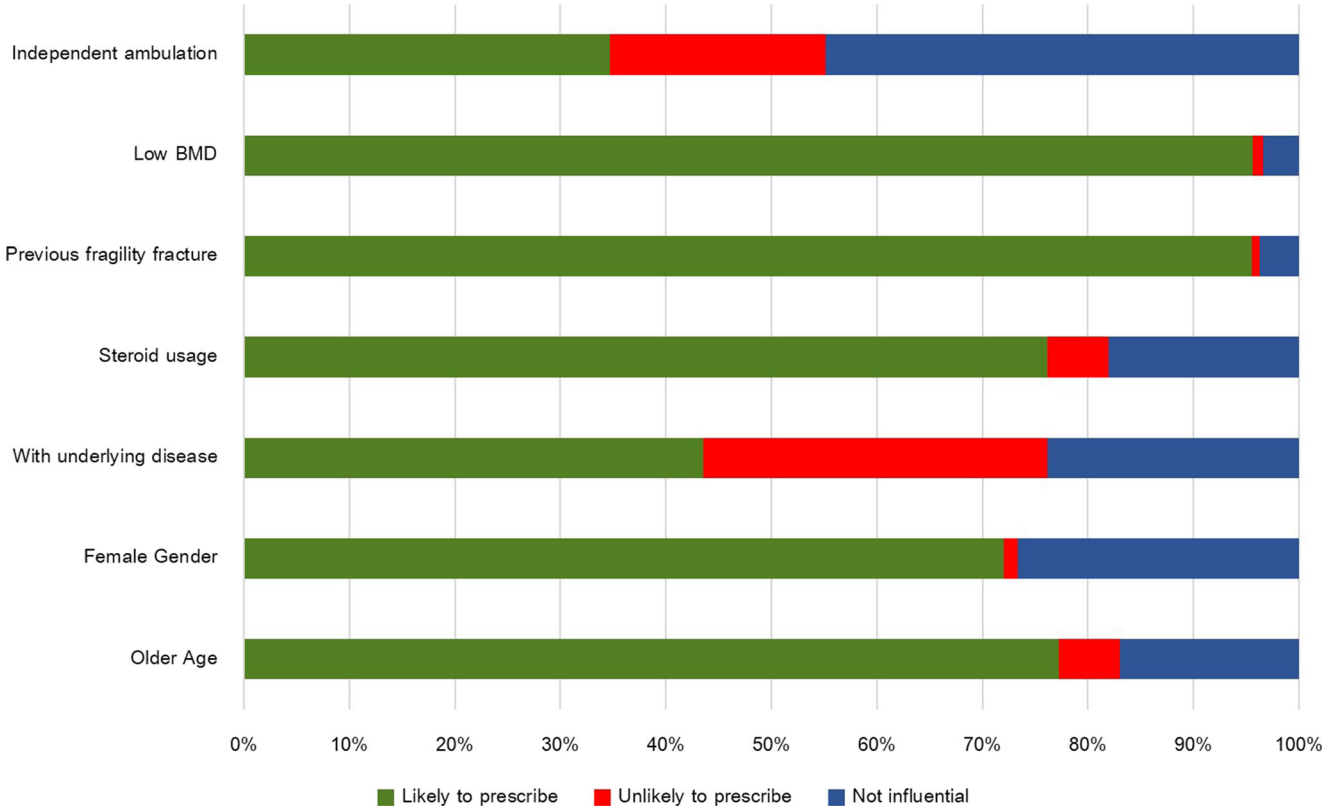


**Fig. 1** Factors affecting the prescription of anti-osteoporosis medication

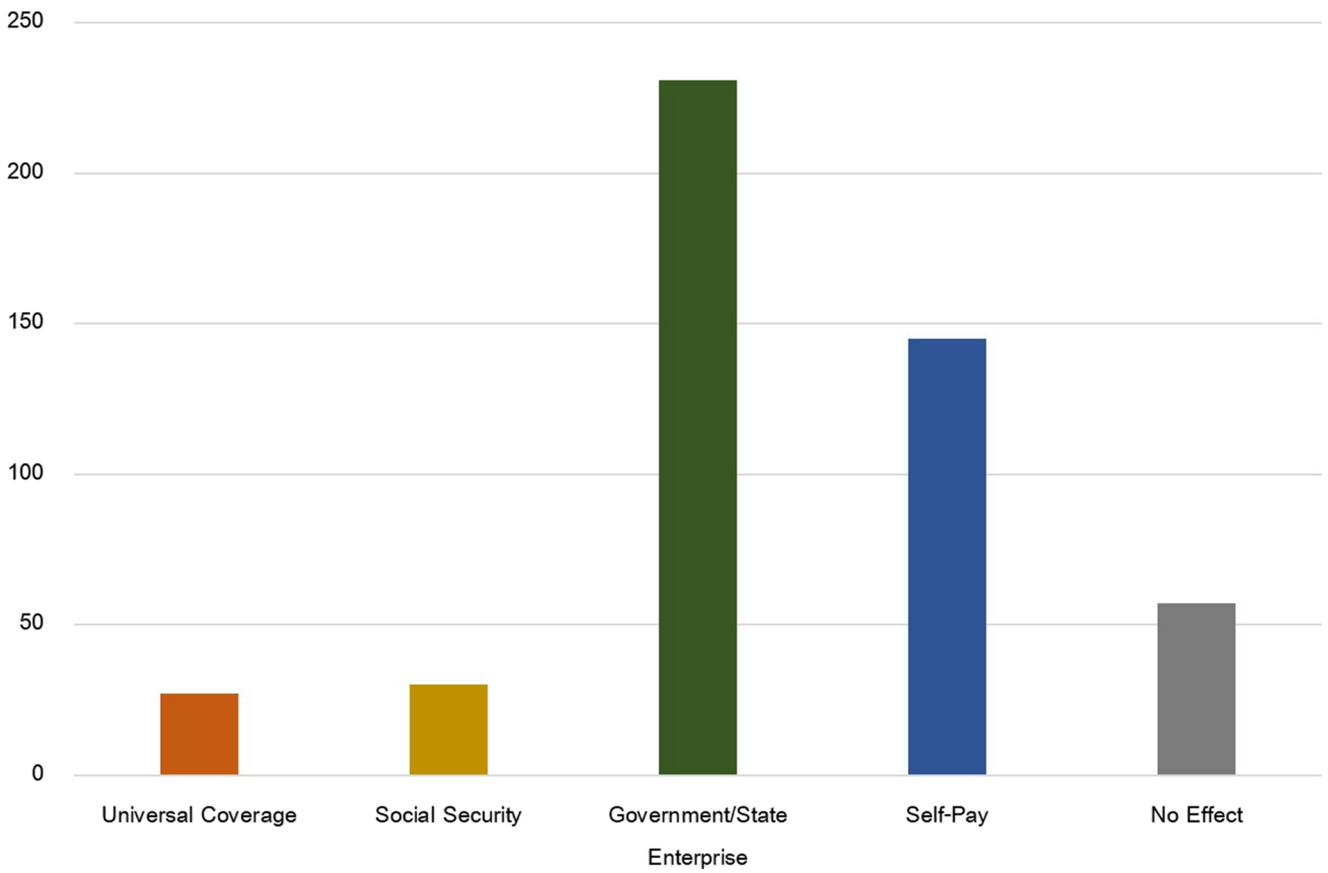


**Fig. 2** Health insurance schemes that are likely to be prescribed anti-osteoporosis medication

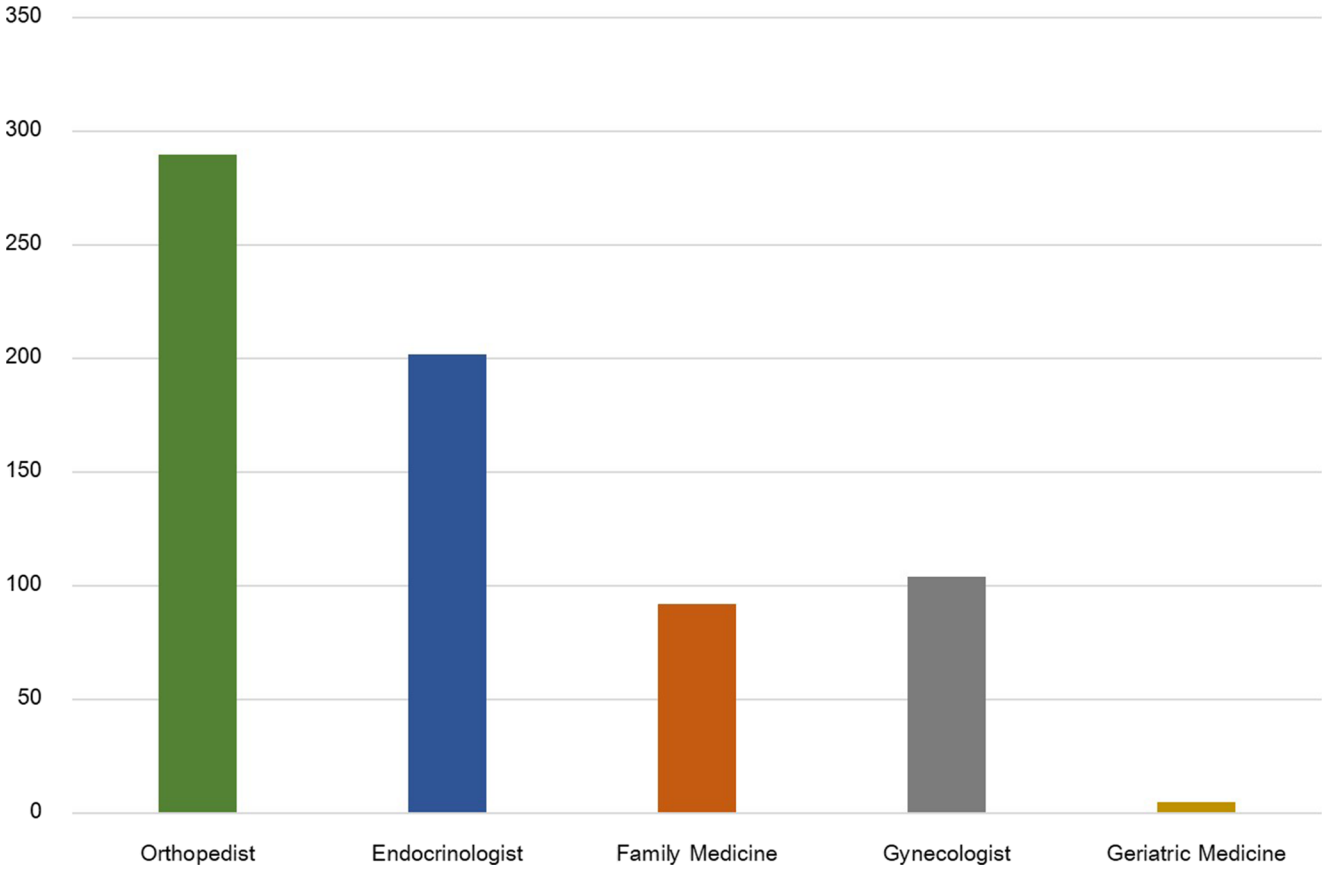


**Fig. 3** Medical specialties responsible for prescribing anti-osteoporosis medication

not prescribing the medication. The other reasons were the concern of side effect (31%), inability to involve in the follow-up visits (19%), patients' compliance (12%), availability of osteoporosis evidence in these patients (12%), and insufficient belief in the benefit of the medication (4%). Other minor reasons were demonstrated in Fig. 4.

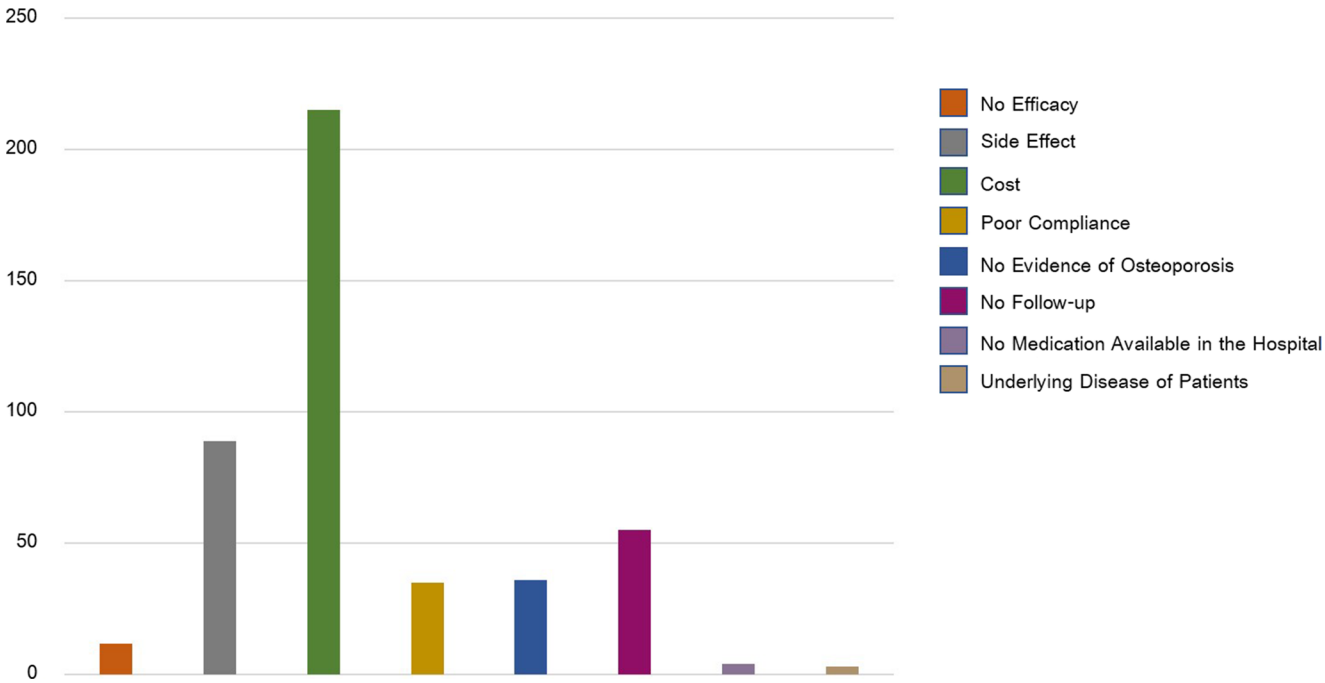


**Fig. 4** Reasons for not prescribing anti-osteoporosis medication

## Discussion

Despite currently available guidelines, relatively low rate of anti-osteoporosis medication prescription was encountered all over the world. The aim of this questionnaire survey was to find potential determinants affecting the anti-osteoporosis medication prescription by orthopedic surgeons in Thailand. Our hypothesis is that doctor characteristics, patient characteristics, and health insurance status may have an effect on medication prescription.

The two strongest affecting factors in our study were previous fragility fracture and BMD result responded as high as 95% of a positive factor for medication prescription which is comparable with the previous study. In 2016, Gu et al. conducted the study to evaluate the physicians' perspectives on the treatment of osteoporosis patients with a bisphosphonate in the USA [13]. A history of previous fracture and BMD were concluded as major consideration factors which are comparable with our study. Since the previous study showed that previous fragility fracture is extremely related to recurrent fracture and should be treated and prevented properly, these patients should receive anti-osteoporosis medications since the first fragility fracture and absolutely should be an impact factor for receiving medications at the second time. BMD measurement was recommended in every case presenting with fragility fracture. The result of BMD measurement is not beneficial for treatment because fragility fracture is, by itself, an indication for osteoporosis treatment regardless of BMD result. BMD measurement has a benefit in monitoring the efficacy of the treatment. Therefore, whether BMD is measured or not (some institutes are unable to provide the BMD test) it should not alter the rate of anti-osteoporosis medications.

According to the belief that osteoporosis is the "old woman's disease", age and gender of the patients are undoubtedly influential for anti-osteoporosis medication prescription. Therefore, many pieces of literature stated that female gender was an important factor for osteoporosis treatment. However, the recent guideline of osteoporosis treatment after hip fracture recommended treatment in both male and female because a number of patients with an osteoporotic fracture are male who will also have a benefit from osteoporosis treatment. Unfortunately, these patients are less likely to be treated even after the fracture occurred. This is possibly one of the reasons for the relatively low rate of medication prescription, especially in male patients.

Type of health insurance scheme is also an interesting factor because the cost of the medications is somewhat expensive. In Thailand, bisphosphonate is not currently included in the National List of Essential Medicines of Thailand. Interestingly, our result demonstrated that type of reimbursement is a remarkable factor influencing the medication prescription. The government/state enterprise scheme, of which the cost of the medication is subsidized, has a high rate of medication prescription compared to other health insurance schemes especially the Universal Coverage Scheme. Cost, especially in a developing country, may be a major factor that prevents patients from receiving the medication. This result is comparable to the previous study. Simonelli et al. [14] conducted a survey to determine the barriers in osteoporosis identification and treatment in primary care physicians and orthopedic surgeons. They concluded that the cost of treatment is one of the leading factors which prevent the anti-osteoporosis medication prescription. Another study also concluded that the cost of treatment is one of the negative factors [15]. Lowering the cost of the medication and/or including the drug into the National List of Essential Medicine which allows the other health schemes to access the medication may increase the rate of anti-osteoporosis medication prescription. Further cost-benefit and cost-effectiveness analysis may require for considering the medication into the national drug list. We think this topic is important because this is the only modifiable factor among the identified factors.

Almost all of the participants agreed that the anti-osteoporosis medication prescription relies on the orthopedist. However, this may result from a sampling bias which all the participants are orthopedists. We believe that it does not matter whether who is responsible for prescribing the medication. The most important thing is to make sure that the patients receive the medication.

This study does have some limitations. We included only orthopedic surgeons whereas the treatment of the osteoporotic fracture is provided by a multidisciplinary team including various medical specialties such as orthopedist, endocrinologist, and family medicine. However, as most of the treatment and follow-up in these patients depend on the orthopedist who performs an initial treatment and discharge, we collected the data from only orthopedic surgeons. Despite the good response rate, the findings from this survey are still not representative of the anti-osteoporosis drug prescription as only orthopedic surgeons were included. Generalizability of the findings would be limited to settings similar to Thailand.

The strength of the study is that the information taken from the real-life health-care providers. The result of the affecting factors represented the opinion of the doctors that find out the reason for not prescribing the anti-osteoporosis medication. From this data, one can use to plan the strategy for expanding the rate of anti-osteoporosis medication prescription, which may lead to a decrease in morbidity and mortality of the patients in the future.

## Conclusion

The rate of anti-osteoporosis medication prescription after fragility hip fracture is very low despite being recommended by the national guideline. Knowing the factors affecting the

prescription of anti-osteoporosis medication is beneficial for strategic planning in order to increase the rate of prescription. The gap of treatment may be reduced, and the morbidity and mortality of the patients can be decreased.

## Compliance with ethical standards

**Conflict of interest** None.

**Ethics approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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