Preference for Hip Protectors Among Older Adults at High Risk for Osteoporotic Fractures

LIANA FRAENKEL, BARBARA GULANSKI, and DICK R. WITTINK

ABSTRACT. ***Objective.*** To determine older adults' treatment preferences for osteoporosis comparing bisphosphonates and hip protectors.

Methods. Subjects at high risk for an osteoporotic hip fracture completed a discrete choice questionnaire to determine preferences for hip protectors versus oral weekly bisphosphonates. Simulations, based on respondents' values for type of treatment and absolute reduction in risk of hip fractures over 5 years, were performed to predict treatment choices.

Results. Seventy-six patients participated in this study (92% participation rate). At the time of the study 57% of the participants were currently using bisphosphonates; none had ever heard of a hip protector. In the base-case scenario, in which both options were described as being equally effective, 9% preferred hip protectors, 88% weekly oral bisphosphonates, and 3% refused all options. When hip protectors were described as being more effective than bisphosphonates, 26% preferred hip protectors, 71% weekly oral bisphosphonates, and 3% continued to refuse all options. Preference for hip protectors was stronger among participants not currently using bisphosphonates (36% vs 19%, p = 0.08), as well as among subjects preferring to avoid taking prescription drugs for most health problems (44% vs 12%, p = 0.002).

Conclusion. When presented with tradeoffs between hip protectors and bisphosphonates, the majority of community-dwelling older adults at high risk for fracture prefer the latter. Of note, however, many of the participants in this study were current bisphosphonate users. Future trials and education programs should consider targeting respondents preferring to manage health problems using nonpharmacologic treatment approaches since, based on the results of this study, adherence and proper use of hip protectors is expected to be higher among these patients. (J Rheumatol 2006;33:2064–8)

Key Indexing Terms:
OSTEOPOROSIS HIP PROTECTORS PATIENT PREFERENCES

Hip fractures are an important cause of morbidity and mortality among older adults[1]. Mortality rates exceed 20% in elderly patients and more than 25% require longterm care or assistance with activities of daily living for at least one year following fracture[1,2]. External hip protectors have been shown to decrease the risk of hip fractures among frail older adults in several controlled trials[3-5]. Studies have also found these devices to be a potentially cost-effective or cost-saving strategy among high risk persons[6,7]. In a recent trial, Cameron, *et al*[8] found that hip protector users had significantly greater improvement in fall self-efficacy compared to nonusers, indicating that hip protectors may increase older adults' confidence and allow them to complete tasks more safely. In contrast, other trials have failed to demonstrate any protective effect associated with these devices, and a recent updated review concluded that these devices are not effective at preventing hip fractures[3]. However, the quality of many of these trials was limited by poor adherence and improper use of the study device[3,9,10]. Moreover, effectiveness of such interventions is difficult to demonstrate, especially in community settings, because of the low rate of hip fractures.

Significant efforts have been directed towards developing newer, more comfortable hip protectors. Researchers have also focused on improving educational programs to increase adherence and proper use of these devices. Yet although treatment preferences for osteoporosis and the prevention of fractures depend on personal values, there have been no studies quantifying older adults' treatment preferences for hip protectors when presented with choices involving explicit tradeoffs between nonpharmacologic and pharmacologic options. Individual patient preferences are particularly important to consider in this context given that adherence with osteoporosis treatment options is low[11-13]. Future efforts towards modifying/promoting hip protectors for osteoporosis should, therefore, ideally be guided by patient preferences. Our objective was to quantify treatment preferences for hip protectors versus bisphosphonates among older adults at high risk for osteo-

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porotic fractures. We used Choice Based Conjoint Analysis (CBCA; Sawtooth Software Inc.®) to elicit preferences. CBCA is a computerized questionnaire that predicts preferences based on how respondents make tradeoffs between the risks and benefits related to the specific options under consideration[14].

MATERIALS AND METHODS

Participants. We recruited women (postmenopausal) and men (over the age of 65) who had recently (within 2 weeks) undergone bone densitometry. Participants were drawn from 6 centers performing bone densitometry in the greater New Haven area.

All English-speaking patients undergoing bone densitometry were asked whether they agreed to be contacted by a research assistant to learn more about, and potentially participate in, a study examining patients' opinions about medications for osteoporosis. Patients were asked to fill out a form indicating whether or not they wished to be contacted.

Subjects at high risk for an osteoporotic hip fracture (Fracture Index Score > 7)[15] were eligible to participate in this study. Only persons with known secondary causes of osteoporosis or contraindications to bisphosphonates (esophagitis, severe heartburn, the inability to sit upright for at least 30 minutes, or previous allergic reactions to bisphosphonates) were excluded. All eligibility criteria were ascertained by self-report. The research protocol was approved by the Human Investigations Committee at our institution.

Data collection. Participants first underwent a standardized educational session with the research assistant regarding the pathophysiology of osteoporosis and its complications. The information presented to participants was based on patient information materials published by the National Osteoporosis Foundation. The educational session was to ensure that all participants had the same information available to them before performing the preference task. All participants were shown, and given the opportunity to handle, an actual hip protector purchased from HIProtector® to ensure that they were familiar with the device. Details on this device are available at www.HIProtector.com.

Participants completed a CBCA questionnaire (Sawtooth Software Inc.®, SSI Web Version 3.5, Sequim, WA, USA) to determine preferences for hip protectors versus oral weekly bisphosphonates[14]. Monthly oral bisphosphonates were not included because this option was not available at the time of the study. CBCA assesses preferences by asking respondents to choose a preferred option from a set of alternatives. Each option is defined using a limited number of characteristics. Respondents do not evaluate treatment alternatives directly. Rather, each participant considers the tradeoffs between conflicting characteristics. Answers to respondent-specific questions allow the investigator to infer values for specific treatment characteristics. These values are then used to predict which option most closely suits each participant's individual preferences.

Conjoint analysis assumes that each option is a composite of different characteristics, and that each characteristic represents one of a number of levels. Levels refer to the range of estimates for each characteristic. The characteristics and levels of the prevention measures included in the questionnaire are described in Appendix 1. Brand names were not included to avoid potential bias. We did not include cost as an attribute in this study because, depending on individual insurance plans, the out-of-pocket costs for both treatment options were exceedingly variable.

We designed the questionnaire to present respondents with 12 choice sets. Each set was composed of 3 treatment alternatives and a "None" option that allowed respondents to refuse all treatments. An example is provided in Appendix 2. We used the software's complete enumeration strategy to construct the choice sets. This strategy constructs options by randomly assigning levels to each option.

Sociodemographic and clinical data were collected by self-report. Attitude towards medications was measured using a question from the Medical Care Preference Scale[16], "I prefer to treat most health problems without help from doctors or prescription drugs" coded on a 5-item response scale ranging from "Strongly disagree" to "Strongly agree." Participants stating that they "Agreed" or "Strongly agreed" with this statement were classified as preferring to treat health problems without doctors or prescription drugs.

Appendix 1. Characteristics included in the CBCA questionnaire.

Characteristic	Level
Type of treatment	• You take one pill once a week. You need to take the pill first thing in the morning before you eat. Side effects are uncommon, but may include stomach pain or heartburn • You wear a hip protector under your clothes every day. No added risk of side-effects
Efficacy	• This option decreases your risk of hip fractures by 75% • This option decreases your risk of hip fractures by 50% • This option decreases your risk of hip fractures by 25% Absolute risk information for reduction in hip fracture risk was provided using frequency data and bar graphs (see Appendix 2)

Analyses. Relative importance of the characteristics studied was calculated by dividing the range of utilities for each characteristic by the sum of ranges, and multiplying by 100. In this context "utility" is a number that represents the value a respondent associates with a particular characteristic, with higher utilities indicating increased value. The relative importance reflects the extent to which the difference between the best and worst levels of each characteristic influenced respondents' decisions to choose a particular option.

We performed simulations based on respondents' values for type of treatment and absolute reduction in risk of hip fractures over 5 years to predict treatment choices. In conjoint analysis, options are defined based on the levels of each characteristic. CBCA generates a predicted overall score for each option in a simulation based on individual respondents' estimated values for specific treatment characteristics[14]. The option with the highest estimated utility, i.e., the option that is most consistent with each individual respondent's values, is regarded as that respondent's predicted choice. Utilities were calculated based on a hierarchical Bayes model using Monte Carlo Markov Chain algorithms[17]. In the base-case scenario, medications and hip protectors were described as being equally effective. We subsequently conducted sensitivity analyses to examine whether increasing the benefit associated with hip protectors affected participants' preferences. Because respondents' preferences were predicted based on how they made tradeoffs between treatment

Table 1. Participant characteristics.

Characteristic	Total N = 76
Age, yrs, mean ± SD (range)	78 ± 5 (65–90)
Female, %	95
Caucasian, %	82
Married, %	41
At least some college education, %	65
Annual household income ≥ $40,000, %	24
Medical insurance, %	
Medicare + private	85
Medicare alone	9
Medicaid	3
Other	3
Having a prescription drug plan, %	62
Currently using bisphosphonates, %	57
Currently using hip protectors, %	0
Health status very good or excellent, %	40

Appendix 2. Example of a CBCA choice task.

If these were your only options, which would you choose?			
You take one pill once a week. You need to take the pill first thing in the morning before you eat.	You take one pill once a week. You need to take the pill first thing in the morning before you eat.	You wear a hip protector under your clothes everyday	None of these options
No added risk of side-effects	Side effects are uncommon, but may include stomach pain or heartburn.	No added risk of side-effects	
This option decreases your risk of hip fractures by 25%.	This option decreases your risk of hip fractures by 75%.	This option decreases your risk of hip fractures by 50%.	

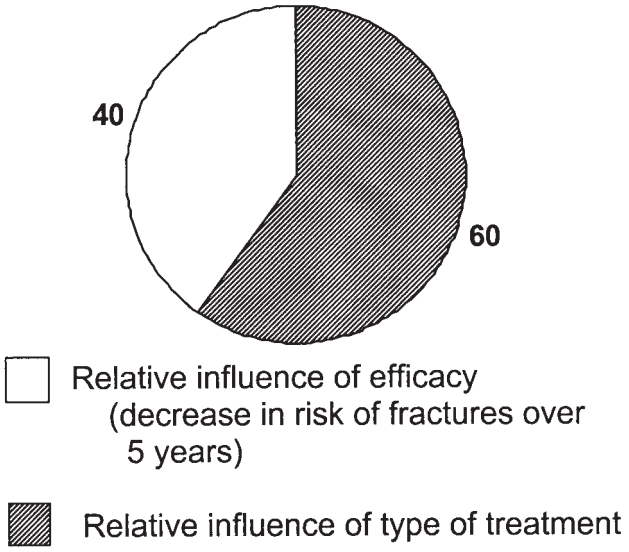

Figure 1. Relative influence of type of treatment versus efficacy on participants' treatment choices. Relative influences sum to 100. Blue = relative influence of efficacy (decrease in risk of fractures over 5 years). Red = Relative influence of type of treatment.

characteristics, they were less biased by familiarity with specific options.

Associations between treatment preferences and participants' characteristics were examined using chi-square and t-tests as appropriate.

RESULTS

Of the 233 patients agreeing to be contacted, 81 were eligible. Seventy-two women and 4 men participated in our study, mean age (± SD) = 78 ± 5 years. Participant characteristics are further described in Table 1. At the time of the study, 57% of the participants were currently using bisphosphonates, and none was using a hip protector. Further, none of the participants had ever heard of a hip protector prior to the study, none had talked to a physician about using one, and none was aware of this option as a potential therapeutic device.

The relative importance of the characteristics studied is shown in Figure 1. Participants' preferences were more strongly influenced by the type of treatment (medication vs device; 60%) than the expected benefits (40%).

In the base-case scenario, in which both options were described as being equally effective, 9% of the subjects surveyed preferred hip protectors, 88% preferred weekly oral bisphosphonates, and 3% refused all options. When hip protectors were described as resulting in a 55% decrease in risk of fracture and bisphosphonates a 50% reduction in future fracture, 26% of the subjects surveyed preferred hip protectors, 71% preferred weekly oral bisphosphonates, and 3% continued to refuse all options (Figure 2). Additional increases in the efficacy of hip protectors over bisphosphonates (as shown in Figure 2) did not further increase the proportion of participants willing to use this option.

Hip protectors were more strongly preferred among participants not currently using bisphosphonates compared to current users (36% vs 19%, p = 0.08). Age, education, income, insurance, and health status were not related to treatment preferences. However, older adults preferring to avoid taking prescription drugs for most health problems were more likely to prefer hip protectors compared to their counterparts (44% vs 12%, p = 0.002). This association remained significant after controlling for current use of bisphosphonates [adjusted odds ratio = 5.6 (95% CI 1.7 – 18.0)].

DISCUSSION

We found that, when presented with tradeoffs between hip protectors and bisphosphonates, the majority of community-dwelling older adults at high risk for fracture prefer the latter. Of note, many of the participants in this study were current bisphosphonate users, and preferences for hip protectors would be expected to be higher among a population in which a greater proportion of subjects were current hip protector users. Participants were more strongly influenced by the type of treatment than expected benefits, and when given a choice most preferred taking a pill over wearing a hip protector. Nevertheless, some of those surveyed did prefer hip protectors over bisphosphonates. This was especially evident among participants not currently using bisphosphonates as well as those preferring nonpharmacologic treatment approaches, as measured by a question from the validated Medical Care Preference scale[16].

The strengths of our study include the methods used to

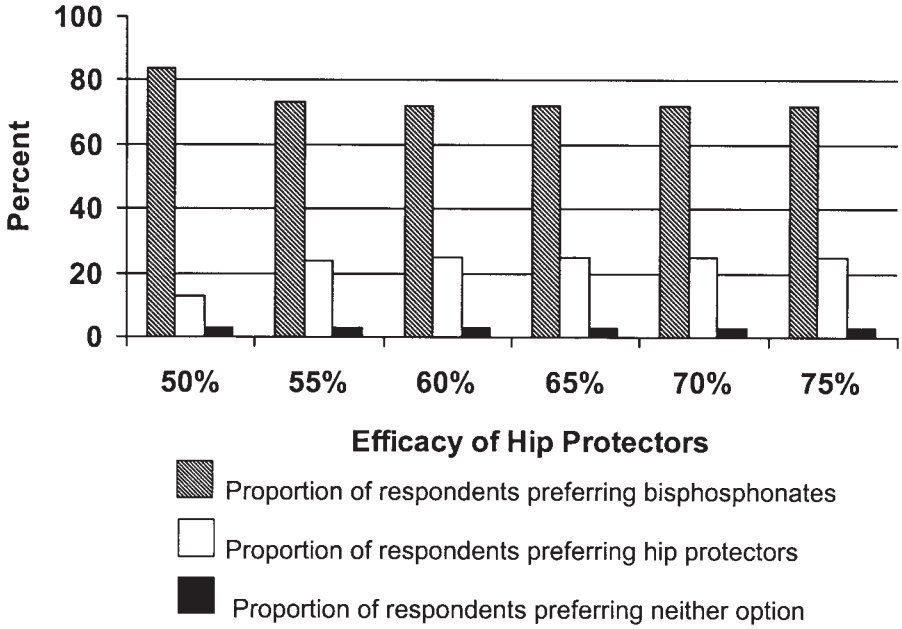

Figure 2. Preferences for hip protectors versus bisphosphonate as the efficacy of hip protectors is increased. Efficacy of bisphosphonates held constant at 50% risk reduction.

elicit preferences and the clinical context in which choices were ascertained. Regarding the former, we used CBCA to derive participants' predicted choices, because this approach requires respondents to make choices based on tradeoffs between specific treatment characteristics. Construction of preferences based on explicit tradeoffs minimizes biases associated with the context in which choices are presented and decreases the influence of individual provider preferences. Most importantly, CBCA has a strong theoretical basis, obtains high levels of internal consistency and, by using hierarchical Bayes analysis, is able to derive preferences at the individual respondent level[17]. In addition, we tried to maximize understanding of risk magnitude using several strategies[18,19]. We provided both numerical estimates (natural frequencies) as well as graphical representations of absolute risk data for fracture risk for patients with and without treatment. Regarding the context in which choices were ascertained, preferences were elicited soon after bone densitometry, thereby ensuring that the task was meaningful for the respondents.

Our results must be interpreted in view of the study's limitations. Although we used robust methods to ascertain preferences, ideally acceptance and adherence to these therapies would be measured as baseline and outcomes measures in a head-to-head randomized controlled trial. In addition, many of the participants interviewed were taking bisphosphonates, because we could not recruit sufficient numbers of treatment-naive, high-risk participants at a relevant point in decision-making. This limits the generalizability of our results. Moreover, preferences for hip protectors would be expected to be higher in a population including current hip protector users. In addition, because of the wide range of costs available for both bisphosphonates and hip protectors, we did not evaluate the influence of cost on patient preferences. We would expect cost to be an important factor in decision-making among older adults on fixed incomes, depending on the constraints of their insurance plans. Lastly, most participants were Caucasian, female, and well-educated, which also limits the generalizability of the results.

In summary, we found that the majority of participants (many of whom were currently using bisphosphonates) preferred oral weekly bisphosphonates over hip protectors. Most patients preferred bisphosphonates over hip protectors, even when the latter were associated with a much greater benefit in terms of hip fracture prevention and no adverse effects. These results suggest that hip protectors, as currently manufactured, are unlikely to be a widely accepted treatment option among community-dwelling older adults. Future trials and education programs should consider targeting respondents preferring to manage health problems using nonpharmacologic treatment approaches since, based on the results of this study, adherence and proper use of hip protectors would be expected to be higher among these patients.

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