Published in final edited form as:
Drugs Aging. 2008 ; 25(12): 1061–1075.

Older Patients' Perceptions of Medication Importance and Worth: An Exploratory Study

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Abstract

OBJECTIVES—Cost-related medication non-adherence may be influenced by patients' perceived importance of their medications. This exploratory study addresses three related but distinct questions: Do patients perceive different levels of importance among their medications? What factors influence perceptions of medication importance? Is perceived importance associated with medications' worth, and does expense impact that association?

METHODS—Study participants included individuals aged 60 and older who were taking three or more prescription drugs. Semi-structured, in-person interviews were conducted to measure how patients rated their medications in terms of importance, expense, and worth. Factors that influence

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All authors declare that no potential conflicts of interests exist, including financial interests or affiliations relevant to the subject of this manuscript.

Institutional review board approval was obtained from Northwestern University.

medication importance were identified using qualitative analysis. Ordinal logistic regression analyses were employed to examine the association between perceived importance and worth of medications, and the impact of expense on that association.

RESULTS—Among 143 prescription drugs reported among 20 participants, the weighted mean rating of medication importance was 8.2 (SD=1.04) on a scale from 0 (not important at all) to 10 (most important). Of all medications, 38% were considered expensive. The weighted mean rating of worth was 8.4 (SD=1.46) on a scale from 0 (not worth it at all) to 10 (definitely worth it). Three major factors influenced medication importance: drug-related (characteristics, indications, effects, and alternatives); patient-related (knowledge, attitudes, and health); and external (the media, healthcare and family caregivers, and peers). Regression analyses showed an association between perceived importance and worth for inexpensive medications (OR=2.23; p=0.002) and an even greater association between perceived importance and worth for expensive medications (OR=4.29; p<0.001).

DISCUSSION—This study provides preliminary evidence that elderly patients perceive different levels of importance among their medications based on factors beyond clinical efficacy and their perception of importance influences how they perceive their medications' worth, especially for medications of high costs. Understanding how patients perceive medication importance may help develop interventions to reduce cost-related non-adherence.

Keywords

medication prioritization; essential drugs; nonadherence; medication adherence

INTRODUCTION

Medication non-adherence due to costs is common, especially among older adults.[1,2] Recent surveys show that between 15% and 50% of older adults report financial hardship due to medication costs and up to 32% take fewer medications than prescribed to minimize their out-of-pocket costs.[3-5] It is well established that the level of drug cost-sharing, not just having drug coverage, exerts a strong influence on medication non-adherence.[6,7] Prior findings also suggest that the influence of drug cost-sharing on non-adherence may differ between therapies. While some studies suggest that cost-sharing decreases adherence based on certain medication indications[7-10] and therapeutic class, [9,11] others have found that medications that prevent deterioration in health or prolong life are less likely to be cut after cost-sharing programs are introduced.[12,13]

The variation in responses to cost-sharing suggests that when faced with cost pressures, patients may selectively reduce adherence to their medications based on an assessment of their expense and importance. According to economic principles of willingness to pay, patients assign worth to healthcare interventions based on the cost of care and the importance of health gain.[14, 15] Therefore, they would be willing to pay for medications if the perceived importance were to outweigh the perceived expense of the drug. A better understanding of how patients perceive the importance of their medications could lead to a better understanding of perceived worth and cost-related non-adherence.

To our knowledge, no studies have directly measured patients' perception of importance, expense, and worth in their medications. The purpose of this exploratory study is to address three related, but distinct, questions: Do patients perceive different levels of importance among their medications? What factors influence perceptions of medication importance? Is importance associated with the worth patients assign to their medications, and does expense impact that association? Based on economic principles of willingness to pay and our conceptualization of how importance, expense and worth are interrelated, we hypothesize that

importance will have a positive association with worth, controlling for perceived expense, because elderly patients will be willing to pay for medications that they consider important (higher perceived importance leads to higher perceived worth) regardless of how expensive the medications are to them. Furthermore, we hypothesize that the relationship between importance and worth will be modified by perceived expense (i.e., an importance-expense interaction) because patients will be willing to pay for inexpensive medications even if they believe the medications are not important; and patients will be willing to pay for expensive medications if they believe their medications are very important.

METHODS

Study Sample

Our study focused on elderly patients because they generally take multiple medications and experience financial hardship in paying for their medications. Eligibility criteria included age 60 and older, three or more prescribed medications taken weekly within the last 30 days, cognitive ability to participate in a one-hour interview, and self-report of some difficulty affording medications within the past year. Investigators worked with clinicians at a large Midwest academic medical institution to identify potentially eligible patients and obtain permission to contact them. Ten potential candidates were identified and eight eligible patients participated in the study. In addition, postal mailings were sent to 157 potentially eligible patients enrolled in an in-house aging research registry that contained a convenience sample of individuals who previously consented to be contacted for research purposes. Fifteen patients contacted the investigators and 12 eligible patients participated in the study. In all, 20 participants (8 + 12) enrolled in the study and their responses were included in the final analysis.

Interviews

Participants were asked to bring a copy of their prescription drug claims from the last six months and pill bottles containing their current prescription medications to the interview. All medications were reviewed with the patient and drug names, drug indications, and out-of-pocket costs were recorded based on what was reported by the patient. If the patient did not know the indication or out-of-pocket cost, we reviewed the information provided on the medication bottle labels or listed on the drug claim forms. We further consulted the Physicians' Desk Reference to confirm all drug indications. Medications not prescribed by a physician and herbal supplements were excluded.

Semi-structured interviews were conducted to assess patients' perceptions of medication importance, expense, and worth. Part one assessed importance by asking: “Rate your drugs on how important they are to you. Use this scale to rate the importance.” Patients placed their pill bottles onto a 1-meter numeric visual analogue scale (VAS), where 0 was “not important at all” and 10 was “most important.” Drugs with equal importance were placed side-by-side on the scale. Part two solicited factors that influenced medication importance by asking semi-structured, open-ended questions: “Explain your importance rating for this drug.” “Why is this drug more (or less) important to you than your other drugs?” Part three assessed perceived expense by asking: “Which of your medications do you consider expensive based on how much you pay for them?” Part four assessed worth by asking: “Given the importance of this drug and the cost to you, do you think this drug is worth it to you? Use this scale to rate the worth.” Patients placed their pill bottles onto a 1-meter VAS, where 0 was “not worth it at all” and 10 was “definitely worth it.” Drugs of equal worth were placed side-by-side on the scale.

Finally, information was collected on age, sex, race/ethnicity, education, and annual household income. Overall health was self-rated on a 10-cm VAS (0=worst health and 10=best health). Financial hardship with drug costs was self-rated on a 10-cm VAS (0=none and 10=a great

deal). The Rapid Estimate of Adult Literacy in Medicine (REALM) was administered to measure health literacy by assessing reading skills in healthcare terms.[16,17]

Three pilot interviews were conducted to assess the understandability and feasibility of the study questions; their responses were used to improve the quality of the study questions but were not included into the final analysis of the 20 participants. Interviews, which lasted an hour on average, were conducted in teams of two interviewers (among ECO, MJ, and TK) at the medical center.

Variables

Drug-Related Variables—Importance and worth ratings ranged from 0 to 10 with higher numbers indicating greater perceived importance and worth, respectively. Perceived expense was a dichotomous variable: 1 indicating expensive and 0 not expensive. Medications were categorized according to prescribed indications.

Person-Related Variables—Socio-demographic variables included age (60-69, 70-79, 80-84, 85 or older), sex, race/ethnicity (White Non-Hispanic, Black Non-Hispanic, and Hispanic), highest education (some college, college degree, and graduate/professional degree), and annual household income ($15,000 or less, $15,001-$35,000, $35,001-$55,000, and $55,001 or more). The number of prescription drugs per patient was a count variable. The monthly out-of-pocket prescription drug costs per patient were calculated from the claims form. Self-rated health ranged from 0 to 10 with higher numbers indicating better health. Self-rated financial hardship with drug cost ranged from 0 to 10 with higher numbers indicating greater hardship. The REALM score was translated to grade-equivalent reading levels.

Analysis

Qualitative analysis using Atlas.ti-v5.2 software was performed to identify factors that influenced patients' perception of medication importance. Transcript content was first coded and analyzed separately by lead interviewer and investigator DL. To ensure analytical consistency, team meetings were held after every two interviews among coders to refine coding strategies and to reach a consensus on discrepant themes. Codes were grouped into common themes according to grounded theory approach.[18] Major recurrent emergent themes were identified using an iterative process of comparison and evaluation across interviews.[19,20] Key themes were systematically organized to yield inter-related but distinct factors that influenced ratings towards higher and lower importance. For example, among patients taking longstanding therapies, some presumed high importance in their medications, while others forgot why they were taking their drugs. In the first situation, the patients' attitude of “presumed trust” led to higher ratings. In the latter, their “low knowledge of medications” resulted in lower ratings.

Quantitative analysis, using STATA-v9, examined the relationships among importance, expense, and worth. Means, standard deviations, and frequency distributions were calculated where appropriate. Mean importance and worth ratings, and percentages of medications perceived as expensive were weighted by patient to account for individuals using multiple medications. To examine the association between importance and worth, worth was modeled as a function of importance and perceived expense (expensive vs. not expensive). Four separate ordinal logistic regression analyses were performed where worth was regressed on: (1) importance; (2) perceived expense; (3) importance and perceived expense; and (4) importance, perceived expense, and an importance-expense interaction. Due to the left skewness of the worth rating, responses were re-categorized to 0-5, 6-7, 8, 9, and 10. One worth rating was rounded from 8.5 to 8.0. To control for rater effects, robust standard errors were estimated to account for the inter-correlation among multiple medications per patient. Due to sample size,

no drug-related or patient-related characteristics were included in the models. Brant's test[21] was used to test the proportional odds assumption among all models; this assumption was satisfied ($p<0.05$).

RESULTS

Study Sample Description

Among the 20 participants, the mean age was 79 (Table I). Most were female, White non-Hispanic, college graduates, and had an annual household income of less than $35,000. The average number of prescription drugs per patient was 8.0 and the average monthly out-of-pocket prescription drug costs per patient was $121.85. The average self-rated health and financial hardship with drug cost were 6.8 and 5.0, respectively. All participants had a high-school health-literacy level according to the REALM scores and had prescription drug insurance through Medicare Part D, supplemental health insurance, and/or retirement health plans.

Medication Description

Among the 154 medications reported by the 20 participants (Table II), 11 drugs were excluded from the analyses. Four medications (Fluoxetine, Mobic, Nexium, and Zelnorm) were excluded because patients did not provide ratings of importance, expense, and/or worth. Seven medications were excluded because they had unique indications not similar to any other drugs prescribed in the study sample ("Others" category in Table II: Zolpidem, Donepezil, Anastrozole, Folgard, Meclizine, Phenobarbital, and Zemplar); because of this uniqueness, calculating the average importance and worth for these medications according to drug categories would be meaningless with only one drug in the category. Among the remaining 143 medications, the top 5 most prevalent drug categories were hypertensive, asthmatic/allergy, psychotropic, gastrointestinal (GI)/urinary and cholesterol agents (Table III). The overall weighted mean ratings of importance and worth were 8.2 and 8.4, respectively. The weighted proportion of all medications considered expensive was 38%.

Factors Influencing Importance

Qualitative analysis revealed three major factors that influenced medication importance ratings: drug-related, patient-related, and external (Table IV contains summary bullets and illustrative quotes).

Drug-related factors included drug characteristics, indications/ purposes, effects when taken or skipped, and alternatives. Some patients considered that medications prescribed to them by a physician were more important than over-the-counter drugs, while other patients assigned low importance to generic brands and to medications prescribed at low doses. Medications were considered more important if they were prescribed to prevent serious adverse health events or premature death. Some medications had high importance because of their indications, such as treating the heart or maintaining cognition. However, lower importance was assigned to medications considered as preventive care rather than used for extending life.

The medications' effects highly influenced importance ratings. Higher importance was given to medications that produced observable therapeutic benefits or improved laboratory test results, especially when they were explained to the patients. Patients also assigned higher importance to medications that, when skipped, resulted in an adverse drug reaction, deterioration of health, or poor test results. However, lower importance was assigned when the medications taken did not produce observable benefits as expected, did not improve test results, or produced unacceptable side effects. Patients questioned their medications' importance when no adverse health events were observed with skipped doses.

When no effective or safe alternatives to the current medications existed, patients generally assigned higher importance to their drugs. Conversely, when non-pharmaceutical alternatives, such as acupuncture, counseling, or dietary interventions, and over-the-counter drugs were available as treatments, patients rated their medications less importance.

Patient-related factors included knowledge, attitudes, and health issues. Elderly patients generally rated drugs they knew best as highly important because they could articulate the purpose of their drugs, the expected benefits and side effects, and potential alternative treatments. Without adequate knowledge of their medication's intended purpose and effectiveness, patients relied on other factors, such as personal experience with their medications' effects or complete trust in their provider's medical advice, to assign importance ratings. Importance ratings were generally lower when patients could no longer remember the significance of their longstanding therapies, could not recall discussions about their therapies with prescribing physicians, or were passive about making medical decisions.

Attitude and health issues also impacted importance ratings. Although some patients were not aware of the significance of their longstanding medications, a few presumed high importance because they had taken the drugs for many years. Patients who doubted the existence or severity of their health problems generally rated their medications less important. A few patients only believed in their medication's importance after “testing” them by deliberately skipping doses to observe adverse effects. A family history of an ailment, prior adverse health events (e.g., heart attack), or high severity of current illness (e.g., chronic neuropathic pain) increased the perceived importance of these medications. Some patients questioned the importance of their medications and the continuing of their therapies, even though their health returned to normal after using the treatments.

Patient-related factors, particularly knowledge and attitude, were influenced by ***external factors***, which included the media, healthcare and family caregivers, and peers. Elderly patients recalled news sources describing adverse side effects of the medications they were taking, as well as television commercials negatively portraying a competing product. Such negative media influence instilled doubts in patients' perceptions of their medications. Patients assigned importance to their medications according to their physicians' medical advice and emphasis on health effects. Credentials and years of practice further strengthened the patients' views. However, patients also attributed lower importance rating to their healthcare providers. Some reported that their physicians failed to educate them about the purpose of their medications, provide evidence on the effectiveness of the therapies, or address adverse side effects appropriately. Patients who received family assistance in managing their medications often lacked an understanding of some of their own treatments. Finally, patients compared their drug regimens to those of their peers and assessed the importance of their medications by comparing their health status to that of their peers.

Relationship between Importance and Worth

To examine the association between importance and worth, four ordinal logistic regression models were estimated (Table V). In the first model that included only importance, as importance increased so did the likelihood of a medication having greater worth (OR=2.61; $p<0.001$). In the second model that included only perceived expense, no significant relationship was observed between perceived expense and worth (OR=0.64; $p=0.418$). In the third model that held perceived expense fixed, an increase in importance rating resulted in an increased likelihood of a medication being assigned with greater worth for inexpensive medications (OR=2.71; $p<0.001$). Similarly, with importance held fixed, the change from inexpensive to expensive medications had a decrease in likelihood of marginal significance to having higher worth (OR=0.43; $p=0.057$). The final model that included both the main effects and interaction between importance and perceived expense showed the following: among inexpensive

medications, as perceived importance increased so did the likelihood of having greater assigned worth (OR=2.23; p=0.002); and among expensive medications, the positive association between importance and worth was even stronger (OR=4.29; p<0.001). (see Table V's footnote for calculations)

DISCUSSION

Previous studies have shown that cost-related non-adherence may affect some medications more than others and cost alone did not explain the selective effect.[1] Using qualitative and quantitative methods, this study explores whether elderly patients perceive different levels of importance among their medications; what factors influence perceptions of medication importance; and whether importance is associated with the worth patients assign to their medications, when considering the expense.

Three conclusions can be drawn from this pilot study. First, elderly patients apparently perceive different levels of importance in their medications and can quantify their perceptions of importance on a scale. Second, elderly patients apparently assign importance to their medications based on a complex set of inter-related factors: drug-related, patient-related, and external. These factors also provide insight into why importance ratings differ across drug and patient types. For example, patients in our study generally rated osteoporosis medications with low importance. These patients explained that the rating reflected their perceptions of the condition as non-life threatening, and that they reported not having received results of any bone-mineral density tests or not experiencing any adverse effects when taking less or skipping doses. Third, our findings provide preliminary evidence that higher importance is significantly associated with higher worth, and that association is affected by medication expense. This suggests that perceived importance could have significant impact on patients' adherence when faced with high cost-sharing.

Maximizing the perceived importance of all medications in a patient's drug regimen may not be practical or even desirable, especially if concerns exist about financial constraints or polypharmacy. Determining the “appropriate” assignment of medication importance may vary based on patients' goals of care and the best medical practices. Continuous monitoring and reconciling potential differences in perceived importance between physicians and patients may have clinical significance over time. For example, a physician may assign high importance to evidence-based medications that prevent life-threatening health conditions, such as statins for heart disease, while an elderly patient may assign high importance to medications that treat distressing symptoms, such as analgesics for chronic pain.

By understanding how patients perceive the importance of their medications, healthcare providers may reinforce factors that generally increase importance, while minimizing factors that lower importance. Our preliminary findings suggest that how patients view the importance of their medications is influenced by the following factors: access to test results; knowledge of the medication's purpose, expected benefits, and potential adverse side effects; and understanding of the value of continuous therapy, even when beneficial effects are not apparent. Other potentially influential factors include patients' understanding of news reports about their therapies and explanations about why other alternatives are not prescribed. Future research should further examine what critical factors exert the greatest impact on patients' perceived importance of their medications.

Our findings on factors that influence patients' perceptions of medication importance are consistent with issues raised in previous studies. Some of these include patient's concerns about continuing medications when laboratory results are normal and miscommunication with physicians about medication indication and side-effects.[22] Our study further suggests that

improving patient-provider communication may reduce non-adherence by changing patients' perceptions of medication importance. This study has focused on cost-related non-adherence because medication worth is most directly related to a patient's willingness to pay for the medication. Other types of non-adherence, such as non-adherence due to forgetfulness or mistrust of the health care system, may also be influenced by medication importance.

Our findings may have implications beyond the physician-patient relationship, such as the potential effect of drug cost-sharing programs on elderly patients. For example, the “doughnut-hole” of Medicare Part D prescription drug benefits at which patient cost-sharing is 100% may force some patients to make adherence decisions based on the importance of their medications. Future research will need to examine whether cost-sharing structures and perceived importance affect cost-related non-adherence behaviors.

There are limitations to this study. First, a non-probabilistic sample of elderly patients was analyzed with no comparison group. The generalizability of our findings needs further investigation in larger samples that include other populations, such as other age groups, and those with lower health literacy level and lower socio-economic status. For example, all of our study participants had at least some college education despite having relatively low annual household income. It is certainly possible that elderly individuals with lower socio-economic status would have different attitudes toward importance and worth of medications. Furthermore, despite their expressed financial hardship with drug costs, all of our study participants had prescription drug coverage, an expected trend as more elderly patients opt to enroll in Medicare Part D.

A second limitation to this study was having a low participation rate. A potential barrier to higher participation might have been the burden required by the study protocol that patients bring all of their medication bottles and copies of their pharmacy claims to the interview.

A third limitation is the limited sample size, which allowed outlier values to have heavy influence on our estimates. For example, only two elderly patients in the study took antibiotics: one rated high importance in her three antibiotics (mean=8) but the other rated low importance in her one antibiotic (mean=3), resulting in a patient-weighted mean importance rating of 5.5. In addition, limited sample size prevented this study from concluding which drug categories generally had higher perceived importance than others, and from including patient and drug characteristics in the regression analyses. Despite these shortcomings, our qualitative analysis revealed that thematic saturation (the threshold after which no new significant insights or themes emerged) was reached in 20 interviews, a number comparable to other qualitative studies.[23,24] Furthermore, inferential statistics were conducted at the drug-level with 143 medication records.

Finally, we examined perceived importance of medications that patients had purchased and acquired; most of the medications were for chronic use. Additional research should examine perceptions of medication importance among incident users to prospectively examine perceived worth of new medications.

CONCLUSION

This study provides preliminary evidence that elderly patients assign different levels of importance to their medications based on factors beyond clinical efficacy. Their perceptions of importance can influence how they perceive their medications' worth, especially among medications that have high cost-sharing or are not covered by insurance. Understanding how patients perceive the importance of their medications may help develop interventions to reduce cost-related non-adherence.

Acknowledgement

We are very grateful to Mr. Scott Anderson, Ms. Theresa Kowalski, Ms. Shalini Singh, and Dr. Adnan Arseven for their assistance throughout this project. We sincerely thank Dr. Kelly Michelson for her comments on an earlier version of this article.

There was no funding source for this study. During part of this study, Dr. Lau was supported by a K-01 career development award from the National Institutes of Health (grant no.: 5K01AG027295-02).

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Table I

Characteristics of Study Sample (n=20)

Characteristics	N (%)
Age (mean = 79.1; SD = 6.1)	
60 to 69	1 (5)
70 to 79	9 (45)
80 to 84	7 (35)
85 or older	3 (15)
Sex	
Male	3 (15)
Female	17 (85)
Race/Ethnicity	
White, Non-Hispanic	16 (80)
Black, Non-Hispanic	3 (15)
Hispanic	1 (5)
Highest Education	
Some college education	5 (25)
College degree	10 (50)
Graduate/professional school degree	5 (25)
Annual Household Income	
$15,000 or less	3 (15)
$15,001 to $35,000	9 (45)
$35,001 to $55,000	5 (25)
$55,001 or more	2 (10)
No Response	1 (5)
Total Number of Prescription Drugs [a] (mean = 8.0; SD= 3.5)	
3 to 5	5 (25)
6 to 8	9 (45)
9 or more	6 (30)
Total Monthly Out-of-Pocket Prescription Drug Costs (mean = $121.85; SD = $62.95)	
$50 or less	3 (15)
$51 to $100	5 (25)
$101 to $150	4 (20)
$151 to $200	6 (30)
$201 or more	1 (5)
No Response	1 (5)
Self-Rated Overall Health[b] (mean = 6.8; SD= 1.9)	
1 to 4	2 (10)
5 to 7	10 (50)
8 to 10	8 (40)
Self-Rated Financial Hardship with Drug Cost[c] (mean = 5.0; SD = 3.0)	

Characteristics	N (%)
1 to 4	8 (40)
5 to 7	7 (35)
8 to 10	5 (25)

[a] Prescription drugs included orals, inhalants, and injections.

[b] Overall health was rated on a scale from 1 to 10, where 1 = the worst health and 10 = the best health.

[c] Financial hardship of drug cost was rated on a scale from 1 to 10, where 1 = none and 10 = a great deal.

Table II

Drug Categories and Corresponding Drugs Reported by Study Participants (Ordered by Prevalence)

Drug Categories and Corresponding Drugs	**N (%)**[a]
All Medications	154 (100)
Hypertensive agents	43 (28)
Atenolol, Irbesartan, Olmesartan, Diltiazem, Doxazocin, Chlorthalidone, Losartan, Valsartan, Felodipine, Furosemide, Hydrochlorothiazide, Lisinopril, Amlodipine, Diltiazem, Metoprolol, Torsemide	
Psychotropic agents	15 (10)
Amitriptyline, Citalopram, Duloxetine, Venlafaxine, Fluoxetine, Escitalopram, Lorazepam, Quetiapine, Trazodone, Bupropion, Alprazolam, Sertraline	
Gastrointestinal/Urinary agents	15 (10)
Rabeprazole, Mesalamine, Darifenacin, Tamsulosin, Polyethylene Glycol 3350, Esomeprazole, Omeprazole, Lansoprazole, Pantoprazole, Tegaserod	
Asthmatic/Allergies agents	15 (10)
Fluticasone and Salmeterol Oral Inhalation, Azelastine Nasal Spray, Chlorpheniramine, Desloratadine, Ipratropium and Albuterol Inhalation, Epinastine Ophthalmic, Fexofenadine, Fluticasone Oral Inhalation, Triamcinolone Nasal Inhalation, Mometasone Nasal Inhalation, Promethazine, Cetirizine	
Cholesterol agents	12 (8)
Atorvastatin, Pravastatin, Fenofibrate, Simvastatin	
Diabetic agents	10 (6)
Exenatide, Metformin, Glyburide, Insulin, Nateglinide	
Cardiac/circulatory agents	9 (6)
Darbepoetin Alfa Injection, Epoetin Alfa Injection, Clopidogrel, Warfarin, Digoxin Oral, Isosorbide, Tikosyn	
Osteoporosis agents	8 (5)
Risedronate, Calcium Carbonate, Alendronate	
Pain relievers	6 (4)
Gabapentin, Hydrocodone, Indomethacin, Meloxicam, Propoxyphene, Quinine	
Potassium supplements	5 (3)
Potassium, Potassium Chloride	
Thyroid agents	5 (3)
Levothyroxine	
Antibiotics	4 (2)
Amoxicillin, Moxifloxacin	
Others	7 (5)
Zolpidem, Donepezil, Anastrozole, Folgard, Meclizine,	
Phenobarbital, Zemplar	

[a] Among the 154 medications, the following 11 drugs were excluded from further analyses: 4 medications (Fluoxetine, Mobic, Nexium, and Zelnorm) with unreported ratings of importance, expense, and/or worth; and 7 medications under the "Others" category (Zolpidem, Donepezil, Anastrozole, Folgard, Meclizine, Phenobarbital, and Zemplar) that had unique indications not similar to any other drugs prescribed in the study sample.

Table III

Mean Importance, Percent of Medications Perceived as Expensive, and Mean Worth (Ordered by Importance)[a]

Drug Category	Drugs[b]	Patients[c]	Importance[d]	Perceived as Expensive[e]	Worth[f]
	N	N	Mean (SD)	%	Mean (SD)
All Medications	143	20	8.20 (1.04)	38	8.40 (1.46)
Pain reliever	5	4	9.78 (0.38)	44	8.00 (3.46)
Thyroid	5	5	8.80 (0.84)	0	9.60 (0.55)
Cardiac/Circulatory	9	6	8.67 (1.51)	8	9.36 (1.06)
Psychotropics	14	10	8.61 (1.62)	35	8.56 (1.33)
Diabetes	10	5	8.60 (1.95)	35	8.55 (2.21)
Potassium	5	5	8.60 (1.52)	40	8.00 (1.58)
Hypertension	43	17	8.29 (1.54)	21	8.88 (1.15)
Gastrointestinal/Urinary	13	11	7.87 (1.58)	67	7.09 (2.49)
Osteoporosis	8	7	7.79 (2.20)	71	6.93 (3.22)
Cholesterol	12	12	7.71 (2.14)	50	8.42 (2.84)
Asthma/Allergies	15	8	7.60 (1.39)	56	7.75 (2.68)
Antibiotics	4	2	5.50 (3.54)	17	5.83 (4.01)

[a] Mean and standard deviation of importance and worth were calculated for all medications and by drug categories, weighted by the patient. Percentages of medications perceived as expensive were calculated for all medications and by drug categories, weighted by the patient.

[b] Eleven drugs were excluded from the original 154 drugs listed in Appendix A, resulting in a total of 143 drugs: 7 medications under "Others" category and 4 medications with missing perception of importance, expensive or not, and/or worth

[c] Patients is not mutually exclusive by drug category; the sum of the number of patients across all drug categories does not equal to 20.

[d] Importance was rated on a scale of 0 to 10, where 10 = most important and 0 = not important at all.

[e] Perception of expense was either 1 for expensive or 0 for not expensive medications.

[f] Worth was rated on a scale of 0 to 10, where 10 = definitely worth it and 0 = not worth it at all.

Table IV

Key Factors and Selected Quotes on How Elderly Patients Perceive the Importance of their Medications

Factors	Towards Higher Importance	Towards Lower Importance
1. Drug-Related Factors		
Characteristics	■ Importance of Medications If Prescribed: I think all [of my prescribed drugs] would be important. But anything I could buy over the counter I don't think is as important.	■ Unimportance of Low Doses: Synthroid, I don't know. The dose is so small. ■ Unimportance of Generic Drugs: My doctor said, "How can one company make one drug and charge $5, and another company makes the same thing and charges $100? You know they've got something in there which is different. " I believe that too.
Indications/ Purposes	■ Importance of Prolonging Life: Warfarin, I have to take no matter what... [it] preventions future strokes. ■ Importance of Indication: I can't be without [Metformin]... it's for my diabetes.	■ Unimportance of Preventive Medicine: Diovan is preventive... [my doctor] told me high blood pressure would be working on the kidneys and diabetes will wear on the kidneys, so this helps...
Effects When Taken	■ Observable Medication Benefit: [Zoloft] keeps me on an even keel... I really feel it helped me flower... I think it has unpeeled the person that I was inside all [along]. ■ Improved Test Results: I asked [my doctor] about my thyroid level and he assured me that with [Synthroid], it's in the normal range. [I'm tested] at least once a year...	■ Unobservable Medication Benefit: [Isosorbid] will have to be [rated low] because I don 'tfeel the effects of it. ■ Observable Adverse Side Effects: Whether [my osteoporosis drug] helps my bones or not, I would [rather] have a cane or crutches or a wheelchair...I would not chose [a drug] that made me dizzy and sick.
Effects When Skipped	■ Observable Adverse Effect with Skipped Doses: When I decided to cut down [Advair]... I had trouble catching my breath...I went back to taking it twice a day... ■ Test Results with Skipped Doses: I [cut back on Lipitor] ...I told [my doctor] after the fact... but my cholesterol got up to 193, so I went back on [Lipitor].	■ Unobservable Adverse Effect with Skipped Doses: I was traveling one time and forgot to pack [my Metformin], and I got tested when I got back. It was right in the same range as before...I didn 't tell [my doctor].
Alternatives	■ Lack of Effective Alternatives: I started with Prozac, but it just made me so jumpy...the Zoloft didn 't have that effect... [but] then I went without Zoloft for a while and when they substituted Cymbalta, it was [even] better.	■ Availability of Non-Pharmaceutical Alternatives: If I watch my diet maybe [my cholesterol] might go down... ■ Availability of Over-the-Counter Alternatives: I can fake Nexium with calcium carbonate... Tums is cheaper too.
2. Patient-Related Factors		
Knowledge	■ High Knowledge of Medication: [I know] what the medications are for ...how long before they take effect... other drugs [my doctor] has not prescribed and why.	■ Low Knowledge about Medication's Purpose or Effectiveness: My doctor doesn 't tell me [if Fosamax is working]... when you take tests, it'dbe nice to know how they came out.
Attitudes	■ Presumed Trust in Longstanding Therapy: I have been taking Klor-Confor a long time so that must be important.	■ Passivity about Health and Medical Decisions: I don't ask what [the drugs are for]...I am still here, it must be the right thing. I'm not asking [my doctor]. ■ Disbelief about Health Problem or Severity: I don't have any heart trouble; I won't rate Plavix [high]. ■ Lack of Trust in the Drug: I [need to try] going without [Lorazepam], which is my "test" to find out whether or not I really need the drug.

Factors	Towards Higher Importance	Towards Lower Importance
Health Issues	■ Family History of Disease: Seems to be a family history of thyroid problems. My daughter just had her thyroid removed. It may be hereditary. ■ Experience with Adverse Health Event: I've been taking Cardizem since my heart attack. I don't want another [one]. ■ High Severity of Illness: I have had blood pressure problems many years..... when I was pregnant I had to be hospitalized because of my blood pressure.	■ Improved Health Condition: Depends where my cholesterol is ...if Ican keep it within 170-195, then I don't think my drug is [important or] worth it
3. External Factors		
The Media		■ News on Adverse Effects: I read about Fosamax and they claimed it [closes your throat up]...I read that in the Wall Street Journal... ■ Negative Advertisement: On TV...here was this tombstone that said rest in peace, andLexapro, Prozac and four [other] depression pills were on this tombstone...it made me kind of leery.
Healthcare Providers	■ Physician's Medical Advice: When I wasn 't taking Klor-Con, my internist called me up...and said, "you can die if you don't have enough potassium. " Literally die, if your potassium drops too low. I'll never forget it. ■ Physician's Credentials: [My drugs] are prescribed by people with 12-15 years of training. And 25-30 years of experience, so I would [rank them important].	■ Lack of Concern for Patient: I had a terrible reaction to this drug. So [my doctor] said, well, nobody else seems to have any problem, but I said, well I'm not somebody else.
Family Caregivers		■ Family Taking Responsibility for the Drug: My husband can tell you about [the drug] ...he's the one "doctor away from the doctor. "
Peers	■ Peers Faring Worse: My friend gets up 14 times a night, her husband about 6 times, and I get up about 1... Apparently [Flomax] does have a good effect on me...	■ Peers Having Different Regimens: This [cholesterol drug] I'm not sure...because some [of my friends] are taking different drugs for the same thing.

Table V

Four Ordinal Logistic Regression Models [a] Examining the Relationship between Worth and the Following Parameters: (1) Importance; (2) Perceived Expense; (3) Importance and Perceived Expense; and (4) Importance, Perceived Expense, and Importance-Expense Interaction

Parameters [b]	Model 1			Model 2			Model 3			Model 4[c]		
	Odds Ratio	**95% C.I.**	**P-Value**	**Odds Ratio**	**95% C.I.**	**P-Value**	**Odds Ratio**	**95% C.I.**	**P-Value**	**Odds Ratio**	**95% C.I.**	**P-Value**
Importance	2.611	(1.645, 4.144)	<0.001				2.705	(1.696, 4.315)	<0.001	2.231	(1.344, 3.707)	0.002
Perceived Expense				0.644	(0.222, 1.866)	0.418	0.432	(0.182, 1.025)	0.057	0.002	(0.001, 0.605)	0.033
Importance* Expense										1.921	(1.021, 3.613)	0.043

[a] Standard error estimates have account for inter-correlation of multiple medications per patient. Due to the sparseness of data, the response categories of worth were recoded to 0-5, 6-7, 8, 9, and 10. One worth rating that was 8.5 was rounded down to 8.0.

[b] Parameters included the following: “Importance” ranged from 0 to 10 with higher numbers indicating greater perceived importance. “Perceived Expense” was either 1 for expensive and 0 for not expensive. “Importance * Expense” was the importance-expense interaction term.

[c] The beta coefficients of Model 4 were 0.80282, -6.2664, and 0.65263 for importance, perceived expense, and importance*expense, respectively. For each unit increase in importance rating, the odds ratio of inexpensive medications having a greater worth was 2.231 (from the table). To obtain the odds ratio of expensive medications having a higher worth for each unit increase in importance, we calculated the odds ratio to be 4.286 (exp[0.80282 + 0.65263]).