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Development of a Tool for Eliciting Patient Priority from Among Competing Cardiovascular Disease, Medication-Symptoms, and Fall Injury Outcomes

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Abstract

OBJECTIVES—To develop a choice task for eliciting priorities in the face of competing cardiovascular disease (CVD) outcomes, medication-related symptoms, and fall injuries.

DESIGN—Conjoint analysis.

SETTING—Senior housing site.

PARTICIPANTS—Convenience sample of 15 senior housing residents for the pretest, 13 residents for the pilot test.

MEASUREMENTS—The final task included 11 sets of choices. In each, one option optimized the risk of one or two of the three outcomes at the expense of the other(s); the second option did the reverse. Relative importance scores for CVD, fall injury, and medication-symptom outcomes were calculated. Reliability was assessed for two administrations using intraclass correlations (ICCs). Wilcoxon rank sum tests were used to evaluate order effects.

RESULTS—The ICCs between choice task administrations were 0.70 for fall injuries, 0.73 for medication symptoms, and 0.56 for CVD outcomes. The ICCs with removal of two outliers were

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0.84, 0.72, and 0.84, respectively. Whether CVD or fall injuries appeared first had no effect on scores.

CONCLUSION—Preliminary evidence of comprehensibility and reliability supports using the choice task to determine whether individuals' priorities differ in the face of competing outcomes.

Keywords

patient priorities; competing health outcomes; clinical decision-making

In patients with multiple health conditions, the treatment of one condition may worsen another one. Clinical decision-making should incorporate patients' priorities when faced with these potentially competing health outcomes.¹ The older adult with coexisting hypertension and fall risk represents a common clinical situation for which a method for eliciting patient priorities would be useful.

Falls and hypertension are both major causes of disability. The 3-year incidence of all nonfatal cardiovascular events in older adults with hypertension is 16.2%,² similar to the incidence of serious fall injury in elderly persons with fall risk.^{3,4} Treatment of hypertension in elderly patients decreases the risk of cardiovascular disease (CVD) outcomes.^{2,5-7}

Although the relationship between antihypertensive medications and fall risk is complex and as yet inadequately studied, most studies adjusting for appropriate confounders have reported a greater risk of falls, fall injuries, or fall risk factors with antihypertensive medications. Conversely, the risk of falls may be decreased if medications are reduced.⁸ Cardiovascular medications, including antihypertensives, are the drugs most commonly implicated in medication-related symptoms and adverse effects.⁹ Furthermore, falling and fall risk factors such as postural unsteadiness, weakness, dizziness, and postural hypotension are among the most common adverse effects of medications, including antihypertensive medications.^{10,11}

The co-occurrence of hypertension and fall risk, therefore, can serve as a model for studying health priorities in the face of potentially competing health conditions, although eliciting priorities raises concerns about well-known challenges, including reluctance to articulate feelings about outcomes not yet experienced, the tendency to select all outcomes as equally important, and change in priorities with time and changing health status.^{12,13} Limited health literacy, the effects of framing and ordering, and inadequate numeracy and communication skills of patients and clinicians further complicate efforts to elicit patient priorities and preferences reliably.¹⁴⁻¹⁶ If, as precepts of patient-centered care espouse, clinical decision-making is to incorporate patients' priorities and individualize therapy to meet these priorities,¹ then an approach must be found that addresses these challenges.

Conjoint analysis,¹⁷ which elicits priorities by asking respondents to make explicit tradeoffs between competing outcomes, is one possible approach that has been applied in several health-related areas. Conjoint analysis has been used successfully in older individuals with visual deficits, limited education, and lack of computer experience.¹⁸⁻²⁰ The aim of the present study was to describe the development and testing of a choice-based conjoint analysis task designed to elicit older individuals' priorities in the face of competing CVD outcomes, medication-related symptoms, and fall injuries.

METHODS

Development of the Choice Task

Choice Based Conjoint Analysis is a computerized questionnaire that predicts preferences and priorities based on how respondents make choices between the risks and benefits related

to the specific options under consideration.^{17–19} Conjoint analysis requires respondents to make explicit choices between competing outcomes. Careful consideration of the tradeoffs involved in complex decisions has been shown to improve the quality of decision-making and is the precise task that patients must perform to prioritize between competing health outcomes.²⁰ Conjoint analysis has a strong theoretical basis and obtains high levels of internal consistency.²¹ Because the outcomes can be programmed to occur in random order, ordering effects are minimized.¹⁷

The first step involved in developing the choice task was to identify and describe the characteristics of the potential trade-offs between three health outcomes domains involved in decisions regarding treatment for hypertension in individuals at risk for falling.²¹ The three outcome domains included CVD outcomes (defined as heart failure (HF), myocardial infarction (MI), or stroke), serious fall injuries (defined as fracture, traumatic brain injury, or serious soft tissue injury such as joint dislocation or hemarthrosis), and medication symptoms such as dizziness or fatigue.

The next step involved determining the risk estimates, that is, the percentage of individuals likely to experience the three outcomes, if they received or did not receive antihypertensive medications. In determining the risk estimates, 5 years was chosen, because it is a time frame frequently used in the trials and is more meaningful than 1-year outcomes. The risk estimates for CVD and serious fall injuries were based on the best available clinical trial and epidemiological evidence.^{2–8,22–25} It was estimated that the 5-year risk of CVD outcomes would be 26% without treatment for the average older individual and would decrease to 18% (absolute risk reduction) with antihypertensive medications. The two risk estimates for CVD were, therefore, 26% (presented as 26 of 100 persons) and 18% (presented as 18 of 100 persons). The corresponding estimated increase in serious fall injury over 5 years with antihypertensive medications in persons with fall risk, based on the available literature, was 18% to 24%. The two risk estimates for medication symptoms were 30% with antihypertensive medications and 10% without medications. These estimates were based on literature showing that cardiovascular medications (including antihypertensive medications and diuretics) are the classes of drugs most commonly associated with adverse drug reactions (ADRs), accounting for approximately 36% of ADRs; neuropsychiatric signs and symptoms that are also fall risk factors (e.g., weakness, dizziness, fatigue) are among the most commonly reported ADRs; and medications are among the most common cause of these symptoms.^{9–11}

The choice task was developed using Sawtooth Choice Based Conjoint Analyses Software (Sawtooth Software Inc., SSI Web Version 3.5, Sequim, WA).²¹ Within each choice set, one option optimized the risk of one or two of the three health outcome domains at the expense of the other outcome(s); the second option did the reverse. An example is presented in Appendix A. Respondents were asked which option they preferred. The choice sets for each of the three health outcome domains were displayed on a large single computer screen so that the participant could view the risk estimates simultaneously for each of the two options. Standard descriptions and explanations were used to describe the outcomes. The language was simple and parallel between the outcomes (Appendix A). The software randomly selected which of the two risk estimates (e.g., 26 of 100 or 18 of 100 for CVD outcomes) were displayed for each outcome. To examine ordering effects, two versions of the choice task were created, one in which CVD outcomes were at the top of the screen and one in which fall injury was at the top of the screen. In both versions, medication symptoms appeared in the middle. One comparison task was programmed to represent an obvious choice (i.e., in which one option included the lowest risk estimates for all three domains) to determine whether respondents understood the choice task.

In designing the choice tasks, possible sources of difficulty or unreliability were considered.^{26–29} The methods used to minimize and detect these sources of unreliable or inconsistent results are shown in Table 1. Given the known difficulties related to interpreting numerical information, for example, strategies known to improve respondents' understanding of probabilities, including presenting risk information using natural frequencies (for example, 1 in 100 people), were used, because they are more easily understood than percentages,²⁷ describing all risk information using absolute (and not relative) risk differences, and employing human figure graphs to illustrate natural frequencies.²⁸

The choice task was written in fifth grade-level English. To minimize problems due to lack of computer skills, low reading literacy, or visual impairment, the interviewer read each question aloud. The choice task program was installed on a laptop to allow portability, with a large screen monitor to enhance visibility. Standard explanations and probes, based on interviews with older adults (see pretest), were developed for interviewers to use in responding to participant questions or to observed difficulties in completing the choice tasks. The interviewers underwent training by the choice task developer (LF).

Pretest and Modification of the Choice Task

A preliminary choice task was administered to a convenience sample of 15 older adults who met the eligibility criteria described under pilot testing. The interviewers recorded their observations and respondents' reports of difficulty understanding the choice task as a whole or any questions in particular and inconsistencies in responses. Respondents and interviewers were asked what changes could make the choice task clearer and more feasible. The questions were modified based on this feedback.

Final Choice Task

The final choice task included 11 sets of choices, each composed of a choice between a pair of options. Eleven choice sets allowed all eight possible options (2 risk estimates for 3 outcomes) to be assessed with moderate redundancy to enhance reliability but without overburdening respondents. The task required approximately 20 minutes to complete.

Results of the choice task were used to calculate three relative importance scores. These scores are based on the coefficients from a hierarchical Bayes model. In this model, the dependent variable is the option chosen by the respondent when presented with two treatment choices. The independent variables reflect the level of risk for each outcome domain associated with each treatment choice. The relative importance scores are the scaled coefficients (i.e., the strength of association between individual outcome domains and the respondent's treatment choice). Details related to these calculations are available at <http://www.sawtoothsoftware.com/techpap>. The relative importance scores, which sum to 100, reflect the extent to which the difference between the risk estimates of each outcome affected respondents' priorities. For example, the interpretation of relative importance scores for CVD, medication symptoms, and serious fall injury of 60, 10, and 30 would be that this respondent places the highest priority on preventing CVD outcomes and is least concerned with medication symptoms. To this hypothetical respondent, prevention of CVD outcomes is twice as important as the prevention of serious fall injury. The median and inter-quartile range (IQR) of the relative importance scores for CVD, fall injury, and medication-symptom outcomes were calculated for the pilot study sample.

Pilot Testing the Choice Task

Respondent Sample—Eligibility for the pilot study were aged 70 and older; hypertension, defined as having been told by a doctor (within the previous 5 years) that the

participant had high blood pressure (e.g., hypertension) or being on antihypertensive medications; and fall risk, defined as a fall in the previous year, self-reported unsteadiness with transfers or walking, or use of an assistive device. Exclusion criteria were moderate or severe cognitive impairment, defined as less than 15 on the telephone version of the Folstein Mini-Mental State Examination (<13 if education <high school);²⁹ nonambulatory or dependent in bathing, dressing, and transferring in and out of a chair; non-English speaking; and receiving warfarin for atrial fibrillation. A convenience sample of 13 residents from age-aggregated housing meeting these criteria was recruited. Informed consent was obtained. Respondents were randomly assigned to the versions that included CVD or fall injury outcomes first. The Human Investigation Committee at Yale School of Medicine approved this study.

Reliability—Two interviewers administered the choice task twice to the 13 respondents, with the second interviewer blind to the results of the first administration. The mean time between the first and second interviews was 7.8 days. The reliability of the relative importance scores for these two occasions was calculated using intraclass correlations.

Order Effects—To check for order effects, the medians and interquartile ranges of the importance scores were examined according to the order in which they were administered. Order effects were tested for using the Wilcoxon rank sum test.

RESULTS

Pretest of Preliminary Choice Task

Areas of difficulty noted by the pretest respondents included having too many options, needing time to understand the concepts behind the questions, too much information on some of the screens, and some wording that was unclear. Interviewers noted that some respondents “got it right away” but that others required repetition of the scripted explanations. Unfamiliarity with the concept of trade-offs, choosing only one field (i.e., CVD, fall injury, or symptoms) to determine their decision, reluctance to choose from between the three undesirable outcomes, and difficulty comprehending the differences in risk levels were difficulties that the interviewers reported.

Interviewers listed simplification and shortening of the choice task questionnaire and repetitive of explanations as two effective strategies for enhancing comprehension and reliability. The interviewers felt that using both numbers and pictures was helpful (one respondent noted that, “*I’m very visual and only look at the little people to make a decision*”), as was presenting the information visually and verbally.

Pilot Test of Final Choice Task

Nine of the 13 respondents were women; the average age $\pm$ standard deviation was 83 ± 9.3 (range 71–96). Nine respondents were white, three were African American, and one was Native American. Respondents had a median of 12 years of education (range 8–16). The average score on the 22-item Mini-Mental State Examination was 19 ± 2.0 (median 19; range 15–21). All 13 respondents gave the correct answer to the obvious choice item, suggesting that they understood the choice task concept. They also completed the choice task, selecting an option for every choice set.

The median relative importance scores of the 13 participants were 14.9 (IQR =9.1–30.5), 19.7 (IQR =13.6–27.9), and 59.4 (IQR =49.2–71.2), for fall injury, medication-symptom, and CVD outcomes, respectively. The intraclass correlation between the two interviewers on the two occasions was 0.70 for serious fall injuries, 0.73 for medication symptoms, and 0.56

for cardiovascular outcomes (Table 2). Removal of two outliers resulted in better reliability: 0.84 for fall injury, 0.72 for medication symptoms, and 0.84 for CVD outcomes. Whether CVD or fall injuries appeared at the top of the screen had no significant effect on scores, as reflected in the medians scores displayed in Table 2.

DISCUSSION

The discrete choice task developed for this study required respondents to choose from between the risks of potentially competing fall injury, medication symptoms, and CVD outcomes that might reflect different treatment options. Results of this study suggest that older adults were able to comprehend the concept of trade-offs and report their priority reliably. The reliability supports the stability of individuals' priorities over a time frame during which changes in health status are unlikely. The reliability test results are similar to those reported in previous studies for other health problems and other populations that have used discrete choice conjoint analysis.³⁰

The order in which the choices are presented and the way the choices are framed have been shown to influence the consistency of decision-making. The median relative importance scores for fall injury, medication symptoms, and CVD outcomes were similar regardless of whether fall injury or CVD outcomes were presented first. Other investigators have confirmed this lack of significant ordering effect with conjoint analysis, a distinct advantage of the choice task approach in communicating risk and eliciting priorities.¹⁷ The way the options are framed, for example, presenting the percentage of people likely to have an event versus the percentage not likely to have the event, is more likely to influence older adults than younger adults.¹⁶ This framing problem was avoided by displaying the numbers who do and do not experience the outcome in the same figure.

Conjoint analysis has been used successfully to establish patients', including older patients', preferences and priorities.^{18,19,30} Important to informed decision-making, the choice task included the outcome and the risk of the outcome. Furthermore, the technique allowed for the assessment of how respondents value health outcomes, rather than interventions, about which they may have inaccurate notions regarding efficacy.

Given its strengths and advantages, there are nevertheless potential problems. It is not clear what to do with responders who consistently focus on a single outcome domain and those who cannot choose when presented the competing outcomes. The prevalence of, and reasons for, these difficulties could not be determined in this small sample, although results of this pilot study suggest that, with careful explanations, these problems will occur with only a minority of older patients. These problems are not unique to conjoint analysis but need to be addressed if patient priority is to be incorporated into clinical decision-making.

Selecting the risks of the outcomes to include presented two challenges. The first challenge related to individualizing versus generalizing risk information, whereas the second was the limits of existing data. Average risk identified from clinical trials and observational studies was used, although an individual's risk may vary according to many factors. People with diabetes mellitus, for example, have higher-than-average risk for CVD and fall-related outcomes. The choice task could be modified to incorporate more individualized risk data, if available. The lack of accurate data on risk of various outcomes under different treatment options for varying subsets of individuals is a limitation of any clinical decision-making method. Ascertainment of risk data for fall injuries was particularly difficult. Adverse effects are not assessed in randomized, controlled trials with the same precision as benefits.³¹ Furthermore, is it likely that the risk of adverse effects in clinical practice differs from the risk seen in randomized, controlled trials because of older age, greater comorbidity,

consumption of more medications, and other factors.⁷ Even if an individual's risk of the outcomes differs from the risk included in this task, determining that individuals can articulate their priority in the face of competing outcomes is important. It is hoped that greater attention to competing outcomes will spur the determination of more-precise risk estimates. In the meantime, the key is to use the best data available in all decision-making encounters with patients.

Men and women, African Americans and whites, and persons with variable educational and socioeconomic levels were included, although the sample was too small to determine differences in comprehension of the task or willingness and ability to report priorities reliably according to these characteristics. These things will need to be explored in larger studies.

The preliminary evidence of comprehensibility and reliability is sufficient to warrant testing the choice task in a larger sample of older adults to further explore practicality and feasibility and to estimate the frequency and predictors of difficulty with making a choice. More importantly, results support using this method to determine whether there is variability in priorities between older adults in the face of competing fall injury, medication symptoms, and CVD outcomes.

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The complete choice task with explanatory scripts and probes and all choice sets can be found at: http://pepper.med.yale.edu/fall_hypertension_choicetask.pdf

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References

1. Institute of Medicine. Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, DC: National Academies Press; 2001.
2. Staessen JA, Gasowski J, Wang JG, et al. Risks of untreated and treated isolated systolic hypertension in the elderly: Meta-analysis of outcome trials. *Lancet*. 2000; 355:865–872. [PubMed: 10752701]
3. Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS). National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (producer); 2003. [online]. Available at: URL: www.cdc.gov/ncipc/wisqars [Accessed July 17, 2007]
4. Tinetti ME, Doucette J, Claus E, et al. Risk factors for serious fall injury among community elderly persons. *J Am Geriatr Soc*. 1995; 43:1214–1221. [PubMed: 7594154]
5. Chaudhry SI, Krumholz HM, Foody JM. Systolic hypertension in older persons. *JAMA*. 2004; 292:1074–1080. [PubMed: 15339901]
6. Mulrow CD, Cornell JA, Herrera CR, et al. Hypertension in the elderly. Implications and generalizability of randomized trials. *JAMA*. 1994; 272:1932–1938. [PubMed: 7990246]
7. Gueyffier F, Bulpitt C, Boissel JP, et al. Antihypertensive drugs in very old people: A subgroup meta-analysis of randomized controlled trials. *Lancet*. 1999; 353:793–796. [PubMed: 10459960]
8. Tinetti ME, McAvay G, Claus E. The Yale FICSIT Trial: Does multiple risk factor reduction explain the reduction in fall rate? *Am J Epidemiol*. 1996; 144:389–399. [PubMed: 8712196]
9. Gandhi TK, Weingart SN, Borus J, et al. Adverse drug events in ambulatory care. *N Engl J Med*. 2003; 348:1556–1564. [PubMed: 12700376]
10. Gurwitz JH, Field TS, Harrold LR, et al. Incidence and preventability of adverse drug events among older persons in the ambulatory setting. *JAMA*. 2003; 289:1107–1116. [PubMed: 12622580]

11. Weingart SN, Gandhi TK, Seger AC, et al. Patient-reported medication symptoms in primary care. *Arch Intern Med.* 2005; 165:234–240. [PubMed: 15668373]
12. Lenert L, Kaplan RM. Validity and interpretation of preference-based measures of health-related quality of life. *Med Care.* 2000; 38:38–50.
13. Cook KF, Ashton CM, Byrne MM, et al. A psychometric analysis of the measurement level of the rating scale, time tradeoff, and standard gamble. *Soc Sci Med.* 2001; 53:1275–1285. [PubMed: 11676400]
14. Scott TL, Gazmarian JA, Williams MV, et al. Health literacy and preventive health care use among Medicare enrollees in a managed care organization. *Med Care.* 2002; 40:395–404. [PubMed: 11961474]
15. Epstein RM, Alper BS, Quill TE. Communicating evidence for participatory decision making. *JAMA.* 2004; 291:2359–2366. [PubMed: 15150208]
16. Kim S, Goldstein D, Hasher L, et al. Framing effects in younger and older adults. *J Gerontol B Psychol Sci Soc Sci.* 2005; 60:P215–P218. [PubMed: 15980289]
17. Ryan M, McIntosh E, Shackley P. Methodological issues in the application of conjoint analysis in health care. *Health Econ.* 1998; 7:373–378. [PubMed: 9683097]
18. Farrar S, Ryan M, Ross D, et al. Using discrete choice modelling in priority setting: An application to clinical service developments. *Soc Sci Med.* 2000; 50:63–75. [PubMed: 10622695]
19. Fraenkel L, Gulanski B, Wittink D. Preference for hip protectors among older adults at high risk for osteoporotic fractures. *J Rheumatol.* 2006; 33:2064–2068. [PubMed: 17014021]
20. Janis, IL.; Mann, L. *A Psychological Analysis of Conflict, Choice, and Commitment.* New York: The Free Press; 1985. *Decision-Making.*
21. Johnson, RM. *Adaptive Conjoint Analysis.* Sawtooth Software Conference Proceedings; 1987. p. 253-265.
22. Agostini JV, Han L, Tinetti ME. The relationship between number of medications and weight loss or impaired balance in older persons. *J Am Geriatr Soc.* 2004; 52:1719–1723. [PubMed: 15450051]
23. Lord SR, Ward JA, Williams P, et al. An epidemiological study of falls in older community-dwelling women: The Randwick falls and fractures study. *Aust J Public Health.* 1993; 17:240–245. [PubMed: 8286498]
24. Rozenfeld S, Camacho LA, Veras P. Medication as a risk factor for falls in older women in Brazil. *Rev Panam Salud Publica (Pan Am J Pub Health).* 2003; 13:369–375.
25. Agostini JV, Tinetti ME, Han L, et al. Association between antihypertensive medication use and non-cardiovascular outcomes in older persons. *J Gen Intern Med.* in press.
26. Miller GA. The magical number seven plus or minus two; some limits on our capacity to process information. *Psychol Rev.* 1956; 63:81–97. [PubMed: 13310704]
27. Hoffrage U, Gigerenzer G, Krauss S, et al. Representation facilitates reasoning: What natural frequencies are and what they are not. *Cognition.* 2002; 84:343–352. [PubMed: 12044739]
28. Edwards A, Elwyn G, Mulley A. Explaining risks: Turning numerical data into meaningful pictures. *BMJ.* 2002; 324:827–830. [PubMed: 11934777]
29. Roccaforte WH, Burke WJ, Bayer BL, et al. Validation of a telephone version of the mini-mental state examination. *J Am Geriatr Soc.* 1992; 40:697–702. [PubMed: 1607586]
30. Ryan M, Netten A, Skåtun D, et al. Using discrete choice experiments to estimate a preference-based measure of outcome—an application to social care for older people. *J Health Econ.* 2006; 25:927–944. [PubMed: 16464513]
31. Ioannidis JP, Lau J. Completeness of safety reporting in randomized trials: An evaluation of 7 medical areas. *JAMA.* 2001; 285:437–443. [PubMed: 11242428]

Appendix A: Explanation of Outcomes for Choice Task

Heart Disease and Stroke

A **Heart Attack** happens when a blockage in a blood vessel in the heart cuts off the blood supply to part of the heart.

Heart Failure (a.k.a. Congestive Heart Failure) happens when the heart does not pump as well as it should, which may cause swelling, shortness of breath, or difficulty catching your breath.

➡ If you have a **Heart Attack** or **Heart Failure**

- You might improve **OR**
- You may have trouble exercising and become short of breath more easily, which makes it difficult to do activities you used to be able to do **OR**
- You may die after a **Heart Attack** or from **Heart Failure**.

A **Stroke** is a blockage or bleeding of a blood vessel in the brain.

➡ If you have a **Stroke**

- You may get better **OR**
- You might have trouble moving one side of your body and/or have trouble talking or thinking. These problems might be mild, or they might be bad enough that you cannot walk or talk or take care of yourself **OR**
- You might die after having a **Stroke**.

Fall Injuries

A **Fall** or **Falling Down** means going down to the floor without meaning to.

➡ If you **Fall**

- You might be able to get up by yourself without getting hurt **OR**
- You might **not** be able to get up by yourself, and you might have to stay on the floor until someone comes to help you **OR**
- You might have an injury (get hurt). The injury could be minor, such as a bruise, or it could be serious, such as a broken hip or an injury to your head. After a broken hip or head injury, you may get better, or you may not get better. These problems may be mild, or they can be bad enough that you cannot walk or take care of yourself **OR**
- You might die after having a bad injury from a **Fall**.

Medication Symptoms

Symptoms

➡ When you take **medication**

- You may **not** have any **symptoms** or problems with blood pressure pills **OR**
- You may have **symptoms** such as feeling dizzy, tired, groggy, or foggy in your head.

Introduction to Choice Task

As you know, when people get older, they sometimes have more than one health problem. Doctors try to pick treatments that help people without hurting them. However, when people have more than one health problem, a treatment may help one problem while making other health problems worse. What we are going to talk about today is what would be most important to you if you were in a situation where a treatment may help one of your problems but make other health problems worse.

I know that you would not want to have a stroke or heart attack, an injury from a fall, or symptoms from medications and that your choice would be to have none of them. But what we would like to know is, if you had to choose, like if your doctor wanted to know if you wanted to take a certain treatment, which of these health outcomes are MOST IMPORTANT to you. I will be showing you pairs of treatment choices. Each one increases the chance you will have a good outcome for one problem but a worse outcome for another problem. I will also be showing you the chance of each outcome happening by showing you how many people in a hundred will have the outcome. That is what we call chance. I will show you with words and pictures what I mean.

There are going to be 11 screens. And each screen will be set up the same. The screen will show two treatment plans—Plans A and B. Each screen will show your chance in 100 people of having each of the three outcomes (stroke or heart attack, injuries due to a fall, and symptoms from medications) with the plan. As you can see, we have squares of 100 people—the red people get the outcome and the black people don't.

Figure 1.
Example of Two Options in a Choice Set

Table 1**Methods Used to Detect and Minimize Unreliable Results in the Hypertension—Fall Risk Choice Task**

Source of Difficulty or Unreliability	Methods to Minimize Effect	Methods to Detect Difficulty
Cognitive impairment	Exclude from study	Result of cognitive screening test such as Mini-Mental State Examination; ability to pass obvious choice task (Appendix A)
Language	Exclude from study if not English speaking	Interviewer assessment
Reading comprehension or literacy	Interviewer reads all text; simple text (fifth grade); standard probes; repetition; ask participant to repeat what interviewer read; ability to pass the obvious choice task	Appears confused; expresses confusion or inability to understand; gives haphazard, inconsistent answers; fails obvious choice task
Numeracy literacy	Ability to pass the obvious choice task; interviewer reads all text; simple text (fifth grade); standard probes; ask participant to repeat what interviewer read; present figures as well as words to convey risks; risk information presented with frequencies (e.g., 1 in 100 people) rather than percentages	Does not understand the absolute risk numbers; appears confused; expresses confusion or inability to understand; gives haphazard, inconsistent answers
Limited ability to process too much information	Reduce the number of choice sets; use parallel wording throughout the task	Based on the pretesting
“Computer or test anxiety”	Start with obvious choice task; interviewer reads all text; simple text (fifth grade); standard probes; frequent reassurances	Expresses anxiety; appears anxious
Emotionally charged trade-offs impede decision-making	Nonjudgmental, unbiased presentation of the options; begin with a less-emotionally charged choice task; standard probes	Gives inconsistent responses to the same questions; repeatedly asks interviewer what she thinks
Visual impairment	Interviewer reads all text; large screens with large print and color contrasts	Visual testing
Hearing impairment	Participant can read along with interviewer; interviewers trained in speaking with hearing impaired elderly people	Hearing test
Ordering effect	Randomly assign order to balance the two groups (i.e., screens with fall injury first and screens with cardiovascular outcomes first); all outcomes presented together	Test for ordering effect by comparing the median scores of the two groups
Framing effect	Stick figures convey numbers with and without the event, eliminating framing effect	
Reliability	Training and feedback; regular recalibrations; standard probes and scripts	Administer second choice task within 7 days of first administration; calculate intraclass correlations between the two administrations

Table 2

Reliability and Relative Importance According to Order of Administration (N =13)

Outcome Domain	Reliability	Order of Administration		P-Value
	ICC (ICC When Two Outliers Omitted)	Cardiovascular Disease (n =6)	Serious Fall Injury (n =7)	
		Median (IQR) *		
Serious fall injuries (e.g., traumatic brain injury, hip or other fracture)	0.70 (0.84)	17.9 (12.3–32.4)	14.7 (13.4–20.8)	.73
Medication symptoms such as fatigue or dizziness	0.73 (0.72)	16.5 (15.4–22.2)	19.0 (16.6–26.8)	.25
Cardiovascular (e.g., myocardial infarction, heart failure, stroke)	0.56 (0.84)	63.3 (42.9–71.1)	60.2 (55.5–66.6)	.94

* Medians and interquartile ranges (IQRs) of the mean score across all administrations.

ICC =intraclass correlation.