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The Relationship Between Universal Health Outcome Priorities and Willingness to Take Medication for Primary Prevention of Myocardial Infarction

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Abstract

OBJECTIVES—Patients with multiple medical conditions face many treatment decisions involving tradeoffs between benefits and harms of medications. Asking patients about their priorities regarding universal health outcomes that are common across different conditions could simplify this process. However, it is not known how well universal health outcome priorities represent patients' preferences in specific clinical situations.

DESIGN—Observational cohort study.

SETTING—Community.

PARTICIPANTS—Three hundred and fifty seven community-dwelling adults age 65.

MEASUREMENTS—Participants used three tools assessing universal health outcome priorities related to two common tradeoffs: quality versus quantity of life, and future health versus present inconveniences/burdens of treatment. We analyzed the tools' ability to identify participants who

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Author Contributions

Study concept and design: Siobhan M. Case, Terri R. Fried. Acquisition of subjects and data: Terri R. Fried, John O'Leary. Analysis and interpretation of data: Siobhan M. Case, Terri R. Fried. Preparation of manuscript: Siobhan M. Case, Terri R. Fried. Editing of manuscript: Terri R. Fried, Nancy Kim, Mary E. Tinetti.

were unwilling to take a medication that reduced the risk of myocardial infarction but caused dizziness and fatigue.

RESULTS—There were consistent and significant associations between unwillingness to take the medication and prioritizing quality of life or future health on all three tools in the expected direction ($p < .05$). Despite these associations, the positive and negative predictive values for the tools were generally modest (PPV/NPV 0.49-0.83). The tool with the most specific statements resembling the medication scenario had the best specificity (0.97) and PPV (0.83).

CONCLUSION—Universal health outcome priorities were only modestly able to identify older persons who would be unwilling to take a medication for primary prevention of myocardial infarction that causes adverse effects. While tools that are the most general in their assessment of priorities have the benefit of being applicable across the widest range of scenarios, tools with greater specificity may be necessary to inform individual treatment decisions.

Keywords

Health priorities; decision-making; geriatric assessment/methods; comorbidity; cardiovascular diseases/prevention & control

INTRODUCTION

Decisions about taking preventative medications require weighing the expected benefits in reduced disease incidence or progression against possible harms (1). The process is especially complex for the two thirds of older adults who have two or more chronic conditions (2) and who experience polypharmacy, with 73% of those with three or more conditions taking at least five medications(3). Older persons taking multiple medications have an increased risk of adverse drug effects in general (4-6) as well as impaired balance (7), falls (8), weight loss (7), and hospitalization(9). Patients vary in how they consider risks and benefits, with prior studies documenting the strong influence of adverse effects on patients' willingness to take a medication(10, 11), and different thresholds for the minimum acceptable benefit a medication needs to provide(12, 13). When faced with tradeoffs between competing outcomes, where a treatment's intended benefits may negatively impact another aspect of a patient's health, patient preferences need to guide the shared decision-making process (5, 14).

Much research has been done about the psychology of decision-making to better understand how patients make treatment decisions. These studies illustrate challenges around making good decisions, such as presentation of information, cognitive biases, and difficulty predicting preferences for future states of health(15). Despite these issues, a central tenet of shared decision-making is consideration of patients' preferences (16), such as through the use of decision aids (17), which generally ask about values regarding disease- and treatment-specific outcomes. While decision aids can improve decision quality, this approach is cumbersome for persons with multiple chronic conditions, since many of the choices they face involve preference-sensitive tradeoffs and using a decision aid for each would be time-intensive. This raises the question of whether it is possible to elicit patients' values in a way that would be applicable to multiple decisions.

One approach is the elicitation of values that apply across multiple treatment scenarios, such as universal health outcome priorities(18). Universal health outcomes, including prolonging life, maintaining independence, and controlling symptoms, are common to many diseases and decisions (19). Focusing on universal outcomes allows benefits and harms associated with multiple conditions or decisions to be mapped onto a smaller set of broadly generalizable outcomes. Priorities can then be expressed in terms of what matters most when a patient evaluates tradeoffs between these outcomes, such as quality versus quantity of life, or a treatment's present inconveniences versus future gains in health. However, there is a tension between evaluating priorities in a manner that is sufficiently general to apply across multiple decisions and sufficiently specific to inform a given individual decision.

This study focuses on the relationship between universal health outcome priorities expressed using three tools (20, 21) and older persons' preferences when faced with a specific medical decision. The tools vary in their descriptions of tradeoffs among universal outcomes from highly general terms to more detailed examples. While decision analysis and multi-attribute theory are well established approaches to elicit universal outcome priorities (22, 23), these methods are complex, and, when used by older adults, frequently yield inconsistent results (24, 25). The tools in this study were developed based on how older adults naturally think about tradeoffs (26) and have been shown to be easy and reliable for use with older adults (27). The purpose of our study was to investigate whether individuals' health outcome priorities can identify their willingness to take a medication that reduces the risk of myocardial infarction (MI) but also causes adverse effects. We compare the tools' ability to identify this group in order to explore the level of detail necessary to elicit general health priorities that also relate to specific medical decisions.

METHODS

Participant Recruitment

Volunteer participants were recruited through presentations at group events at three senior centers and an independent/assisted living facility in the New Haven, Connecticut area. Recruitment sites were selected to include a sociodemographically and ethnically diverse population. Inclusion criteria were being age 65 or older and speaking English as primary language. The only exclusion criterion was having a diagnosis of dementia as provided by the social worker at the assisted living facility. The Yale University School of Medicine's Human Investigations Committee approved the protocol.

Data Collection

A trained research associate interviewed all participants in person. All data were self-reported. Demographic and health information included gender; age; race and ethnicity; education; health literacy using the seven-item REALM-Short Form (REALM-SF) (28); chronic conditions; functional status using instrumental activities of daily living (IADLs) (29); and self-rated health and quality of life (QOL).

Universal Health Outcome Prioritization Tools

Participants used three universal health outcome prioritization tools that vary in the level of detail describing tradeoffs (Figure 1). The Health Outcome Prioritization tool is a visual analogue scale (VAS) that asks about tradeoffs in the most general terms by having participants rank the outcomes of “keeping you alive,” “maintaining independence,” “reducing or eliminating pain,” and “reducing or eliminating other symptoms including dizziness, fatigue, and shortness of breath”(20). Since the latter three outcomes represent QOL domains, we combined these into a single QOL category for comparison with the first outcome representing quantity of life. The Present vs. Future Health Prioritization tool adds a level of detail by asking people to take into account the time at which an outcome occurs. It displays two VASs on which participants rate the importance of their present QOL versus QOL at both one and five years in the future(27). A score of 50 indicates equal importance of present and future QOL, while scores >50 favor present QOL and scores <50 favor future QOL. Finally, the Time and Outcome Preference (TOP) Scale assesses attitudes toward the most detailed representation of tradeoffs by presenting statements specifying outcomes(21). Subscale 1, Quality vs. Quantity of Life, asks participants to consider tradeoffs among health outcome domains, such as “I would rather live a shorter life than lose my ability to take care of myself.” Subscale 2, Present vs. Future Health, addresses tradeoffs between future gains in health versus adverse treatment effects and inconveniences in the present, such as “I would prefer to take fewer medications, even if it meant that my chances of dying would be higher.” Participants rate their strength of agreement with statements on a 5-point Likert scale. Agreement is averaged across the number of statements in each subscale, giving a score between 1 and 5. Lower scores favor quantity of life and future health, and higher scores favor QOL and present health. Each tool takes between 5 to 8 minutes to complete.

Medication Willingness

Willingness to take medication for primary prevention was assessed by asking patients whether they would take a medication to reduce their risk of MI that also causes an adverse effect (30). The medication was described as being taken once per day and being covered by insurance. Participants were told that taking the medication would reduce their risk of having an MI in the next five years from 20 in 100 to 14 in 100, reflecting the average risk reduction that has been shown for statins (31) and antihypertensives(32). The adverse effect was presented as dizziness and fatigue mild enough not to interfere with ADLs. Participants were classified as unwilling to take the medication if they responded “Not sure” or “No.”

Analysis

Participants’ responses on the three universal health outcome tools were compared to willingness to take the medication. The medication scenario was constructed so that the logical relationship between the medication decision and tool responses was that people who were unwilling to take the medication would value quality over quantity of life and present over future health (33).

We tested the significance of the overall association between willingness to take the medication and responses to the Health Outcome Prioritization tool with the chi-square test,

and to the Present vs. Future Health Prioritization tool with the Mantel-Haenszel chi-square test. For the TOP Scale, we used non-parametric Wilcoxon Two-Sample tests to assess for the statistical significance of differences in subscale scores between those who were unwilling and willing to take the medication. We present mean scores as a more easily interpretable representation of the findings.

In order to determine how well the tools measuring general values could identify individuals who were unwilling to take the medication, we examined sensitivity, specificity, and positive and negative predictive values (PPV and NPV). In this analysis, each tool was analogous to a diagnostic test, for which these test characteristics describe how well a positive test response identifies persons with a given disease. This approach has been used to examine the relationship between general goals of care and specific end-of-life treatment decision-making (33). For the Health Outcomes tool, a positive response was prioritization of QOL. For the Present vs. Future Health Prioritization tool, a positive response was prioritization of present health or equal prioritization of present and future health. We tested multiple cut points for each of the TOP subscales, ultimately selecting one that optimized test characteristics while including a large enough group for analysis. No correction was made for multiple comparisons given the study's exploratory nature.

RESULTS

Participants' sociodemographic and health characteristics are listed in Table 1. Three participants who responded that they "Do not understand the question" and one participant with missing data for the health outcome prioritization tools were excluded from subsequent analysis.

All three tools showed significant associations between preferring QOL or present health and being unwilling to take a medication causing dizziness and fatigue. On the Health Outcome Prioritization tool, 56% of those favoring QOL were unwilling to take the medication versus 38% of those favoring quantity of life ($p=.04$) (Table 2). There were also significant associations between Present vs. Future Health Prioritization responses for both timeframes and willingness to take the medication (Table 2). When considering a five-year timeframe, there was a step-wise increase in unwillingness to take the medication among those prioritizing future (46%), equal (53%), and present health (61%) ($p=.02$). For the one-year timeframe, 42% of those prioritizing future health were unwilling to take the medication versus 64% of those prioritizing present health and 63% of those prioritizing future and current health equally ($p=.0002$). Finally, participants who were unwilling to take the medication had higher mean scores on each of the TOP subscales, indicating that they placed higher priority on quality over quantity of life (3.7 vs. 3.4, $p=.002$), and present over future health (2.8 vs. 2.5, $p<.001$).

Each tool's sensitivity, specificity, PPV, and NPV are displayed in Table 2. The Health Outcome Prioritization tool had a high sensitivity of 0.92, but the NPV was modest at 0.62, related to the high proportion of participants who were unwilling to take the medication. Values for Present vs. Future Health Prioritization showed modest sensitivity, PPV, and NPV, and modest to poor specificity (Table 2). The TOP scale showed high specificities of

0.88 and 0.97 for Subscale 1 and 2. The PPV was modest for subscale 1 (0.69) and high for subscale two (0.83). Using a high cut-off point to identify the small proportion of individuals with the most extreme views on the scale maximized specificity and PPV, but reduced sensitivity.

DISCUSSION

In this study of community-living older persons, we compared individuals' universal health outcome priorities to their willingness to take a medication in a hypothetical scenario that provides realistic benefits in reduction of MI and causes mild dizziness and fatigue. The prioritization tools varied in their description of tradeoffs from general to increasingly detailed, and focused on tradeoffs between quantity versus QOL and future versus present health. There were consistent and significant associations between willingness to take medication and prioritizing QOL or present health on all three tools. However, there was substantial overlap in medication decisions of participants who prioritized quantity or QOL, and present or future health. The TOP Present vs. Future Health subscale most closely represented the specific treatment decision and best identified unwillingness to take the medication.

Research in end of life care has also examined the relationship between general treatment goals and preferences for specific life-sustaining interventions (33, 34). In these two prior studies, the general goals were associated with willingness to undergo specific interventions, such as cardiopulmonary resuscitation, in a logical, consistent manner. However, similar to the current study's results, the general goals had only a modest ability to identify willingness. As in the present study, these general goals focused on the valuation of quantity versus QOL, and one paper suggested that individuals may have differing attitudes about what constitutes an adequate QOL when applied to specific situations (33). Our results provide additional evidence that patients who hold the same general valuation of health outcomes may differ in more specific valuations, so that general assessments of outcome priorities will not provide sufficient detail to inform individual decisions. However, our results suggest that universal health outcome prioritization tools can nonetheless be useful in a clinical setting. The positive association between tool responses and the treatment decision suggests that tools could be used as a starting point for helping patients think about how their values matter and relate to treatment decisions about their chronic diseases. Establishing a framework for older persons to deliberate about their values can help to facilitate more in-depth discussions for specific scenarios to ask patients about detailed tradeoffs. For example, a patient on multiple medications who prioritized quality over quantity of life could be asked to reflect on the point at which their QOL would be affected enough to not take an additional preventative medication that may increase their risk of adverse drug effects.

One limitation of the study is that participant responses to the medication scenario may inaccurately reflect whether they would decide to take the medication if faced with the actual decision. Furthermore, individuals are not always accurate in knowing how they would value a future health state (35). The medication scenario provided an oversimplification of the typical choices faced by patients regarding preventative medications.

Preferences and beliefs outside of the ones captured by universal health outcome priorities may also be influencing willingness to take the medication. We did not ask participants their beliefs about life expectancies, which can influence valuations of future health.

Generalizability is limited by our samples' geographic location and characteristics, especially the high levels of education and good overall health. Tools require patients to be cognitively intact, similarly to other approaches to preference elicitation.

This study suggests that universal health outcome prioritization tools capture broad values that are meaningful in considering specific treatment options. The TOP subscale on present versus future health was most successful in identifying participants who were unwilling to take medication for primary prevention of MI with an adverse effect. However, treatment decisions varied substantially within groups of people who prioritized the same universal health outcome. The tools may be best used to identify patients whose universal health outcome priorities fall at the extremes, where these general values are more predictive of specific treatment decisions. Tools can also facilitate shared decision-making by helping patients articulate general priorities that can apply to multiple or overlapping treatment decisions.

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1. Health Outcome Prioritization

2. Present vs. Future Health Prioritization

3. Time and Outcome Preference (TOP) Scale

Subscale 1: Quality vs. Quantity of Life	Subscale 2: Present vs. Future Health
1. The most important thing to me is living as long as I can, no matter what my quality of life is.	1. I am willing to have side effects right now if it means I could have a better quality of life in the future.
2. I would rather live a shorter life than lose my ability to take care of myself (daily activities).*	2. I would prefer to take fewer medications, even if it meant I would not live as long.*
3. It is more important to me to maintain my thinking ability than to live as long as possible.*	3. I am willing to put up with more doctors' visits and dietary restrictions now if it means that in the future I will be less likely to develop a new disease.
4. If I had to choose between living as long as possible or being free from pain, I would choose living as long as possible.	4. I would prefer to have fewer medical tests and doctors' visits, even if it meant that I would not live as long. *
	5. It is more important for me to feel well right now than to feel well in the future.*
	6. I would prefer to take fewer medications, even if it meant that my chances of dying would be higher.*

*Scoring reversed for these items

Figure 1. Universal Health Outcome Prioritization Tools

Displays of the three universal health outcome prioritization tools presented to patients.

Table 1

Participant demographic and health characteristics (N=353)

Female (% (N))	75 (265)
Age (% (N))	
65-74	44 (155)
75+	56 (198)
White (% (N))	75 (266)
Education (% (N))	
High School (12 th)	51 (180)
Health Literacy (REALM-SF (26)) (%)	
<9 th Grade	26 (90)
9 th Grade	75 (263)
Chronic Conditions (% (N))	
0-2	16 (57)
3-5	46 (161)
6	38 (135)
1+ Disabilities in Instrumental Activities of Daily Living (IADLs) (% (N))	26 (91)
Self-Rated Health (% (N))	
Excellent/Very Good/Good	85 (300)
Fair/Poor	15 (53)
Quality of Life (QOL) (% (N))	
Best Possible/Good	91 (320)
Fair/Worst	9 (33)

Table 2

Relationships between participants' universal health outcome priorities and their to willingness to take a medication for primary prevention of MI

Universal health outcome priority	Willingness to take medication causing dizziness and fatigue		P-value*	Sensitivity	Specificity	Positive predictive value	Negative predictive value
Unwilling/Not Sure (N=191)Willing (N=162)							
HEALTH OUTCOME PRIORITIZATION TOOL							
QOL highest priority (N=314)	176	138	0.04	0.92	0.15	0.56	0.62
Quantity of Life highest priority (N=39)	15	24					
PRESENT VS FUTURE HEALTH PRIORITIZATION TOOL							
Timeframe 5 Years							
QOL now highest priority, or QOL now and 5 years from now equal priority (N=254)	145	109	0.07	0.76	0.33	0.57	0.54
QOL 5 years from now highest priority (N=99)	46	53					
Timeframe 1 Year							
QOL now highest priority, or QOL now and health 1 year from now equal priority (N=196)	125	71	<.001	0.65	0.56	0.64	0.58
QOL 1 year from now highest priority (N=157)	66	91					
TIME AND OUTCOME PREFERENCE (TOP) SCALE							
Quality vs. Quantity of Life Subscale							
Score >4 to 5 (N=62)**	43	19	.008	0.23	0.88	0.69	0.49
Score 1 to 4 (N=291)**	148	143					
Present vs. Future Health Subscale							
Score >3.5 to 5(N=30)**	25	5	.0008	0.13	0.97	0.83	0.49
Score 1 to 3.5(N=323)**	166	157					

* From Chi Square Test.

** Score range 1-5, higher scores indicating greater preference for QOL and Present Health.