Health Values of Hospitalized Patients 80 Years or Older

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Context.—Health values (utilities or preferences for health states) are often incorporated into clinical decisions and health care policy when issues of quality vs length of life arise, but little is known about health values of the very old.

Objective.—To assess health values of older hospitalized patients, compare their values with those of their surrogate decision makers, investigate possible determinants of health values, and determine whether health values change over time.

Design.—A prospective, longitudinal, multicenter cohort study.

Setting.—Four academic medical centers.

Participants.—Four hundred fourteen hospitalized patients aged 80 years or older and their surrogate decision makers who were interviewed and understood the task.

Main Outcome Measures.—Time–trade-off utilities, reflecting preferences for current health relative to a shorter but healthier life.

Results.—On average, patients equated living 1 year in their current state of health with living 9.7 months in excellent health (mean [SD] utility, 0.81 [0.28]). Although only 126 patients (30.7%) rated their current quality of life as excellent or very good, 284 (68.6%) were willing to give up at most 1 month of 12 in exchange for excellent health (utility ≥0.92). At the other extreme, 25 (6.0%) were willing to live 2 weeks or less in excellent health rather than 1 year in their current state of health (utility ≤0.04). Patients were willing to trade significantly less time for a healthy life than their surrogates assumed they would (mean difference, 0.05; P<0.007); 61 surrogates (20.3%) underestimated the patient’s time–trade-off score by 0.25 (3 months of 12) or more. Patients willing to trade less time for better health were more likely to want resuscitation and other measures to extend life. Time–trade-off score correlated only modestly with quality-of-life rating (r=0.28) and inversely with depression score (r=0.27), but there were few other clinical or demographic predictors of health values. When patients who survived were asked the time–trade-off question again at 1 year, they were willing to trade less time for better health than at baseline (mean difference, 0.04; P<0.04).

Conclusion.—Very old hospitalized patients who could be interviewed were able, in most cases, to have their health values assessed using the time–trade-off technique. Most patients were unwilling to trade much time for excellent health, but preferences varied greatly. Because proxies and multivariable analyses cannot gauge health values of elderly hospitalized patients accurately, health values of the very old should be elicited directly from the patient.

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physiology score (APS) component of the Acute Physiology and Chronic Health Evaluation III prognostic scoring system. Patients who were not intubated and were able to communicate, and were able to pass a cognitive screening test were eligible to be interviewed. Trained interviewers interviewed patients and surrogates approximately 4 days and 12 months after study entry.

The health value measure used was the time-trade-off score. Patients and their surrogates were independently asked in a systematic fashion whether the patient would prefer living only 1 year in the patient’s current state of health or less time in excellent health, until an indifference point was ascertained. The time-trade-off score was then calculated as the fraction of a year in excellent health that was equivalent to 1 year of current health. For example, if the patient were indifferent about choosing between living 12 months in their current state of health or living only 9 months in excellent health, their time-trade-off utility would equal 9 divided by 12 or 0.75. Possible scores ranged from 0.04 (equivalent to indifference between 2 weeks in excellent health and 1 year in current health) to 1.0. After the respondent completed the time-trade-off question, the interviewer judged whether the respondent understood the task; respondents who did not understand were excluded.

Health status instruments included (1) a global quality-of-life question, in which the respondent was asked to rate the patient’s quality of life as excellent, very good, good, fair, or poor; (2) a revised measure of dependence in activities of daily living over the previous 2 weeks; (3) a revised version of the Duke Activity Status Index, which assesses ability to perform strenuous activities; (4) a shortened version of the Profile of Mood States, which assesses anxiety and depression; and (5) a measure of frequency and severity of pain.

In addition, we asked questions concerning preferences regarding cardiopulmonary resuscitation (CPR); willingness to tolerate each of 6 potentially lifelong adverse outcomes—pain, mechanical ventilation, tube feeding, coma, confusion, and living in a nursing home; preferences for care focused on extending life as much as possible, even if it means having more pain and discomfort, vs care focused on relieving pain and discomfort as much as possible, even if it means not living as long; and perceived prognosis for surviving for 2 and 12 months and for functioning independently in 2 and 12 months.

We assessed the effect of the patient’s illness on family members in terms of assistance needed and savings depleted. For the Duke Activity Status Index, missing items were imputed from surrogate responses for 5 patients.

Statistical Analysis

Means are expressed as mean (SD), and medians are given with 25th and 75th percentiles. Continuous variables were compared using the Wilcoxon rank sum test. Within-patient changes over time were assessed with the Wilcoxon signed rank test. Concordance between patients’ and their surrogates’ time-trade-off scores was assessed using the Wilcoxon signed rank test. Univariate associations between the time-trade-off and the health status measures, measures of perceived prognosis, willingness to tolerate adverse outcomes, and demographic variables were assessed using Spearman correlation coefficients.

Because time-trade-off scores were not normally distributed, we used multivariable ordinal logistic regression to identify significant predictors of time-trade-off scores at day 4 and month 12. Variables significantly associated with time-trade-off scores in univariate analyses (when P<.10) and variables found to have been related to time-trade-off scores in the Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments study were entered into the model and retained through backward elimination, if P was less than .05. A summary statistic for the ordinal logistic regression models is Somers D, which measures the models’ ability to predict time-trade-off utilities. For a binary outcome (high vs low utilities) the statistic is a linear function of the area under the receiver operating characteristic (ROC) curve (D = 2×(area under ROC–0.5)).

Within-patient changes in time-trade-off scores were compared with changes in other measures using the Kruskal-Wallis test and Spearman correlation coefficients. Analyses were performed using SAS statistical software (SAS Institute, Inc, Cary, NC).

RESULTS

Patients and Interviews

The HELP study enrolled 1266 patients. Many patients could not be interviewed: 25 patients (2.0%) were comatose or intubated or both; 272 (21.5%) were unable to communicate for other reasons; 204 (16.1%) failed the cognitive screening test; 29 (2.3%) died or were discharged within 72 hours; and 2 (0.2%) were ineligible for other reasons. Of the 734 eligible for interview, 622 (84.7%) participated. Of those 622, 62 (10.0%) terminated the interview before the time-trade-off question was asked. Of the remaining 560 patients, 43 (7.7%) refused.
to answer the time-trade-off question, answered “don’t know,” or had missing or incomplete answers. Of the 517 patients completing the time-trade-off question at their initial interview, interviewers provided judgments regarding the patient’s understanding in 475 cases (91.9%); 414 (87.2%) were judged to have understood the task. Those 414 patients formed our main analytic sample (Table 1). In-hospital and 12-month mortality rates and APS scores were significantly higher (higher APS scores indicate more severe illness) for the 882 excluded patients than for the 414 who completed the time-trade-off question.

Among the 414 patients, 319 also had time-trade-off questions completed by their surrogate at day 4. For the 319 surrogates’ interviews, interviewers’ judgments regarding understanding of the time-trade-off question were available for 311 (96.6%), and the interviewer believed that 300 (96.6%) of those surrogates understood the task. Compared with patients who had a matching surrogate interview, patients without a surrogate interview were similar in age, sex, and level of education attained and had similar APS and Duke Activity Status Index scores but slightly more dependencies in activities of daily living (1.08 vs 0.84 dependencies; P=0.02). Of the patients alive at month 12, 176 (52%) completed and understood a follow-up time-trade-off assessment.

Health Values

The mean (SD) time-trade-off score for the 414 patients at their initial interview was 0.81 (0.28) (median [25th, 75th percentiles], 0.92 [0.83, 1.0]). This indicates that, on average, patients equated living 1 year in their current state of health with living 9.7 months (0.81×12 months) in excellent health. But time-trade-off scores varied widely from patient to patient (Figure 1): 169 (40.8%) had utilities of 1.0, meaning that they were unwilling to give up any time in exchange for a shorter life in excellent health, and another 115 (27.8%) had utilities of 0.92, meaning that they were willing to give up only 1 month of 12 (1-0.92×12 months) in exchange for excellent health. Thus, more than two thirds of the patients (284 [68.6%]) were willing to forgo at most 1 month of 12. At the other extreme, 25 (6.0%) had utilities of 0.04, indicating that they preferred living 2 weeks or less in excellent health to living 1 year in their current state of health.

Patients Compared With Their Surrogates

Time–trade-off scores given by surrogates, who were asked to answer as they thought the patient would, also varied widely. For the 300 patient-surrogate pairs, the mean (SD) patient utility was 0.80 (0.30) (median [25th, 75th], 0.92 [0.83, 1.0]) and was higher than the mean surrogate utility by 0.05 (0.38) (median difference, 0 [0, 0.17]; P=.007); 61 (20.3%) of surrogates underestimated the patient’s time–trade-off score by 0.25 (3 months of 12) or more. The correlation between patients’ and their paired surrogates’ health values was modest (r=0.36).

Relationship of Health Values to Other Measures

Time–trade-off utilities were related to patients’ preferences for CPR (Table 2). Patients who desired CPR had a mean (SD) time–trade-off score at day 4 of 0.86 (0.23) (median [25th, 75th], 0.92 [0.83, 1.0]); whereas, patients who preferred not to undergo CPR had slightly lower mean scores of 0.75 (0.34) (median [25th, 75th], 0.92 [0.63, 1.0]; P<.001). Higher time–trade-off scores were also related to patients’ preferences for care that focused on extending life: patients who preferred care that focused on extending life had higher time-trade-off scores (ie, they were not willing to trade away as much time) than patients who preferred care that focused on relieving pain and discomfort.

Health values correlated only modestly (r=0.28) with overall quality of life (Figure 2). A total of 126 patients (30.7%) rated their current quality of life as excellent or very good. For the patients with utilities of 1.0, indicating an unwillingness to trade any time in current health for a shorter but healthier life, only 29 (17.3%) considered their quality of life to be excellent as is; 39 (23.2%) rated it as very good, 61 (36.3%) as good, 32 (19.0%) as fair, and 7 (4.2%) as poor. For the patients with utilities of 0.04 or less, 2 (8.0%) rated their quality of life as excellent, 3 (12.0%) as very good, 6 (24.0%) as good, 3 (12.0%) as fair, and 11 (44.0%) as poor. Health values correlated modestly (and inversely) with level of depression (r=-0.27); but they correlated poorly if at all with other health status measures, willingness to tolerate the 6 adverse outcomes, and perceived prognosis for survival and independent functioning (Table 3). Among the demographic variables, time–trade-off scores were not related to age, sex, race, or level of education. In a multivariable analysis, on average, patients who preferred treatment that extended life were more likely to report high time-trade-off scores (odds ratio [OR], 2.8; 95% confidence interval [CI], 1.8-4.4); in addition, health values were positively related to quality of life (OR, 1.2 for each level of better quality of life; 95% CI, 1.0-1.5) but were inversely related to level of depression (OR, 0.6 for each level of more severely depressed mood; 95% CI, 0.4-0.7; Somers D=0.343).

Health Values 1 Year Later

For the 176 patients who completed the time-trade-off questions at both day 4 and month 12, scores increased over the year by an average of 0.04, from 0.84 to 0.88 (SD of change, 0.30; median, 0; 25th percentile, −0.08; 75th percentile, 0.08; P=.04). This means that, a year after hospitalization, on average, the time patients would give up in their current state of health to be in excellent health had declined by 2 weeks. As at the initial interview, time-trade-off scores were higher among those who de-
Table 2.—Relationship of Patients’ Time–Trade-off Scores to Treatment Preferences

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD) Time–Trade-off Score</th>
<th>Day 4 (n)</th>
<th>Month 12 (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiopulmonary resuscitation (CPR)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer to have it</td>
<td>0.86* (0.23) (248)</td>
<td>0.91† (0.16) (91)</td>
<td></td>
</tr>
<tr>
<td>Prefer not to have it</td>
<td>0.75* (0.34) (166)</td>
<td>0.84† (0.24) (83)</td>
<td></td>
</tr>
<tr>
<td>Treatment to extend life or to relieve pain and discomfort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer to extend life</td>
<td>0.67‡ (0.24) (123)</td>
<td>0.94§ (0.12) (38)</td>
<td></td>
</tr>
<tr>
<td>Prefer to relieve pain</td>
<td>0.77‡ (0.31) (216)</td>
<td>0.85§ (0.22) (101)</td>
<td></td>
</tr>
</tbody>
</table>

*a P < .001 for the comparison of those who prefer at day 4 to have CPR vs those who don’t.
†P = .01 for the comparison of those who prefer at month 12 to have CPR vs those who don’t.
‡P < .001 for the comparison of those who prefer to extend life or relieve pain at day 4 vs those who don’t.
§P < .001 for the comparison of those who prefer to extend life or relieve pain at month 12 vs those who don’t.

Table 3.—Correlation of Patients’ Time–Trade-off Scores With Severity of Acute Illness, Health Status, Preferences for Adverse Outcomes, and Perceived Prognosis*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better perceived prognosis for surviving for 12 mo</td>
<td>0.19‡ (289)</td>
</tr>
<tr>
<td>Better perceived prognosis for surviving for 2 mo</td>
<td>0.09 (330)</td>
</tr>
<tr>
<td>Greater willingness to tolerate tube feeding</td>
<td>−0.01 (382)</td>
</tr>
<tr>
<td>Greater willingness to tolerate receiving ventilatory assistance</td>
<td>0.05 (374)</td>
</tr>
<tr>
<td>Greater willingness to tolerate receiving ventilatory assistance</td>
<td>0.05 (374)</td>
</tr>
<tr>
<td>Greater willingness to tolerate coma</td>
<td>0.00 (387)</td>
</tr>
<tr>
<td>Greater willingness to tolerate confusion</td>
<td>0.10 (365)</td>
</tr>
<tr>
<td>Greater willingness to live in a nursing home</td>
<td>0.03 (383)</td>
</tr>
<tr>
<td>Better perceived prognosis for surviving for 2 mo</td>
<td>0.09 (330)</td>
</tr>
<tr>
<td>Better perceived prognosis for surviving for 12 mo</td>
<td>0.19† (289)</td>
</tr>
<tr>
<td>Better perceived prognosis for functioning independently in 2 mo</td>
<td>0.15§ (356)</td>
</tr>
</tbody>
</table>

*a Correlations were calculated by the Spearman rank correlation test. Ellipses indicate not applicable.
†The inverse correlation is expressed by the word “less.”
‡P < .05.

We are unaware of other studies of time–trade-off utilities focusing solely on hospitalized very old patients. In the Beaver Dam Health Outcomes Study, mean time–trade-off scores for patients older than 75 years with any of a variety of chronic conditions were very similar (0.79-0.84, depending on age and sex) to those we report (mean, 0.81); wide individual-to-individual variation in utilities was also seen.33 Compared with previously studied younger patients, the mean time–trade-off utility of our elderly cohort was slightly lower than that of survivors of myocardial infarction (0.87)35 and slightly higher than that of patients with the acquired immunodeficiency syndrome (0.79)36 and of seriously ill patients (0.73).34 The findings that time–trade-off scores do not correlate well with health status13,36-39 are higher than surrogates believe,32 and increase over time33 are by no means unique to the current study, however.

There are several possible explanations for the abundance of high time–trade-off scores. First, patients may have been unwilling to trade much time for “excellent health” because they thought that their health was excellent at the time; yet, when asked directly, only 13.2% rated it as excellent, and only 17.3% of patients with utilities of 1.0 rated their health as excellent. Second, we used a short time horizon (1 year) in the time–trade-off scenarios. It is possible that, if presented with a longer life expectancy in current health, patients would be willing to trade away a larger...
proportion for a shorter but healthy life. Also, the sequence of the time-trade-off questions or noise in the instrument could have affected the results. Further study of such issues and of other health value measures in elderly patients, sick or healthy, is warranted. Findings from this study are relevant for decision making in both clinical practice and policy making. For decision making at the individual patient level, time-trade-off utilities can be used in a general sense to gauge the patient’s “will to live” or, more precisely, as quality-of-life weights in calculating QALYs for use in decision analyses assessing the risks and benefits of various diagnostic or therapeutic options. For decision making at the allocation of health care resources, QALYs form the denominator of cost-effectiveness (cost-utility) analyses for calculating the incremental costs per incremental QALY gained for various programs, which may in turn be compared with each other. But we should be cautious about promulgating health policy that neglects to incorporate the wishes of individual patients. A recent study of patients with angina by Nease and colleagues also that found wide interpatient variation in health values (for their angina) concluded that guidelines for managing ischemic heart disease should be based on individual patients’ preferences rather than symptom severity. Similarly, with wide variation in the health values of the very old, there is a risk that guidelines developed for their care will not conform to their preferences.

In summary, health values, as measured by the time-trade-off, of very old hospitalized patients who can be interviewed (1) can be elicited in most cases; (2) indicate that patients are unwilling to trade much time in their current health state for excellent health; (3) correlate with few other measures; (4) are higher than surrogates believe; and (5) rise over 1 year among surviving patients who could be reinterviewed. Because health values vary from patient to patient, when possible, health values should be ascertained directly from the patient.

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References

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