A Randomized Trial of Two Methods to Disclose Prognosis to Surrogate Decision Makers in Intensive Care Units

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***Rationale*: Surrogate decision makers and clinicians often have discordant perceptions about a patient's prognosis. There is a paucity of empirical data to guide communication about prognosis.**
***Objectives*: To assess: (*1*) whether numeric or qualitative statements more reliably convey prognostic estimates; and (*2*) whether surrogates believe physicians' prognostic estimates.**
***Methods*: A total of 169 surrogate decision makers for intensive care unit patients were randomized to view 1 of 2 versions of a video portraying a simulated family conference involving a hypothetical patient. The videos varied only by whether prognosis was conveyed in numeric terms ("10% chance of surviving") or qualitative terms ("very unlikely" to survive).**
***Measurements and Main Results*: We assessed: (*1*) surrogates' personal estimates of the patient's prognosis; and (*2*) surrogates' understanding of the physician's prognostic estimate. Neither surrogates' personal estimates nor their understanding of the physician's prognostication differed when prognosis was conveyed numerically versus qualitatively (surrogates' estimate, 22 ± 23% chance of survival versus 26 ± 24%, $P = 0.26$; understanding of physician's estimate, 17 ± 22% chance of survival versus 16 ± 17%, $P = 0.62$). One in five surrogates estimated the patient's prognosis was greater than 20% more optimistic than the physician's prognostication. Less trust in physicians was associated with larger discrepancies between surrogates' personal estimates and their understanding of the physician's estimate.**
***Conclusions*: Neither numeric nor qualitative statements reliably convey news of a poor prognosis to surrogates in intensive care units. Many surrogates do not view physicians' prognostications as absolutely accurate. Factors other than ineffective communication may contribute to physician–surrogate discordance about prognosis.**

Keywords: surrogate decision making; risk communication; prognosis; withdrawing life-sustaining treatment

Surrogate decision makers require a clear understanding of a patient's prognosis to make decisions that reflect the patient's values and treatment preferences. However, surrogates and physicians frequently have discordant estimates of a patient's prognosis (1–3). The reasons for this discordance have not been fully explored. Most commentators have ascribed it to ineffective communication (4, 5). Physicians do not typically receive training in how to communicate prognostic estimates (6). A recent study identified substantial heterogeneity in how physicians disclose prognostic information (7). Some physicians relied exclusively on qualitative statements (e.g., "I think he is unlikely to survive"), whereas others used numeric expressions (e.g., "80% of patients in this situation do not survive") (7). No studies have examined whether using numeric versus qualitative terms improves surrogates' understanding of prognosis.

Our clinical experience is that, even with excellent communication, a gap sometimes remains between physicians' and surrogates' expectations about a patient's prognosis. This raises the possibility that surrogates' *personal estimates* of the patient's prognosis may differ from their *understanding* of the prognostic estimate the physician intended to convey. For example, some surrogates may believe that prognostication is outside physicians' professional capabilities (8, 9). Denial and optimism may also affect patients' and surrogates' perception of a poor prognosis (10, 11).

We therefore conducted a randomized, controlled trial to determine whether numeric or qualitative prognostic statements more reliably conveyed physicians' prognostic estimates. We also assessed whether surrogates' own estimates of the patient's prognosis were different from what the physician told them.

AT A GLANCE COMMENTARY

Scientific Knowledge on the Subject

Surrogate decision makers and clinicians often have discordant perceptions of prognosis in patients with advanced critical illness. There is a paucity of empirical data to guide communication about prognosis.

What This Study Adds to the Field

We tested whether numeric or qualitative statements more effectively convey prognostic information. Numeric prognostic statements were not significantly better than qualitative statements to convey news of a poor prognosis in intensive care units. In addition, most surrogates' personal estimates of the patient's prognosis were more optimistic than what they understood to be the physician's prognostic estimate. Factors other than ineffective communication, such as lack of confidence in physicians' prognostications or alternative explanatory models of illness, may contribute to physician–surrogate discordance about prognosis.

METHODS

Subjects and Setting

Eligible participants were surrogate decision makers for any critically ill patient in intensive care units (ICUs) at the University of California, San

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Francisco Medical Center. The ICUs included two medical–surgical ICUs, a neurological ICU, and a cardiac ICU. Surrogates were excluded if they were younger than 18 years old or required an interpreter to understand written or spoken English. We also excluded family members and friends who visited the patient, but were not centrally involved in decision making. A study coordinator screened for participants daily by identifying family members present in each ICU waiting room or at the patient's bedside. Before approaching a potential participant, the study coordinator contacted the attending physician for permission. Between February 2005 and May 2008, we identified 214 eligible surrogates; 171 individuals provided written consent, and 169 completed the survey. The University of California, San Francisco Institutional Review Board approved all study procedures. This study did not require clinical trial registration, because there was no intervention affecting any patient's health outcome.

Video Content and Development

Participants were randomly assigned to view one of two versions of a 10-minute video of a simulated physician–family conference discussing end-of-life care issues in a hypothetical, incapacitated ICU patient. The two videos differed only by whether the physician used a numeric or qualitative prognostic estimate. Half of the participants saw a version of the video where the physician used qualitative statements to convey his prognostic estimate: "I would say it's very unlikely that he will survive. Saying it another way, that means it's very likely he's going to die." The other half saw a version of the video using a numeric prognostic estimate: "I would say he has about a 10% chance of surviving. Saying it another way, that means there's about a 90% chance that he's going to die." Full transcripts of the family conference are provided in Appendix I.

The videos were developed through extensive collaboration with experts in bioethics, critical care medicine, palliative care medicine, and sociology (12). The ICU family conference addressed a common "type" of life support decision, involving a patient with a small chance of short-term survival, but a high likelihood of substantial functional impairment, including ventilator dependence. We "created" a physician who was empathic and adhered to recent evidence about quality communication in ICUs (7, 13–19). The physician explained the medical scenario, expressed empathy, explained principles of surrogate decision making, discussed the patient's prognosis, asked a series of questions to elicit information about the patient's values, and explained the treatment options.

Outcomes Measurement

We assessed surrogates' *personal estimates* of the patient's prognosis with the following question: "What do you think are the chances that this patient will survive the hospitalization, if intensive treatment is continued?" We assessed surrogates' *understanding* of the physician's prognostic estimate with the following question: "What do you think the doctor in the video thinks are the chances that this patient will survive this hospitalization, if intensive treatment is continued?" All participants, in both the numeric and qualitative prognosis groups, responded by marking a standard 0–100 probability scale, labeled on the left with "0% chance of survival" and on the right with "100% chance of survival" (20) (*see* Appendix II). We chose the qualitative descriptor "very unlikely to survive" because, in two studies, medical professionals assigned the term "unlikely" a mean probability of 14% (21) and 20% (22). Another study found that the adverb "very" served as a "multiplier" of qualitative terms, increasing their value by 1.25 to 1.32 times (23). In light of these studies, "very unlikely" would have a mean probability between 9.5 and 15%, a range that includes 10%, the value used in our study.

We defined *discordance* as the absolute difference between surrogates' personal prognostic estimates and their understanding of the physician's prognostic estimate.

The question assessing surrogates' understanding of the physician's prognostic estimate was added after the study had commenced, because intercurrent findings from our group suggested that surrogates may not believe physicians' prognostications (8, 9). In the subset of 126 participants who completed the question about understanding, none of the demographic characteristics differed significantly between the groups receiving a qualitative versus a numeric prognosis.

Staff members responsible for data entry were blinded to group assignments.

Assessment of Covariates

In addition to standard demographic information, the questionnaire included three questions adapted from Schwartz and colleagues (24) to assess numeracy, with 1 point for each correct response, resulting in a maximum numeracy score of 3. To measure surrogates' trust in their loved one's current ICU physicians, we used the abbreviated physician trust scale developed and validated by Hall and colleagues (25). Surrogates answered five questions rating the physicians on a 5-point Likert scale. Totaling the responses generated a cumulative scale, with 25 representing the greatest physician trust. To minimize respondent burden, and because of surrogates' limited exposure to the physician in the video, their trust in that physician was measured with a single question with a 7-point Likert scale. A 4-point Likert scale was used to measure the importance of "religious or spiritual beliefs in ... [the surrogate's] day-to-day life."

Statistical Analysis

We used STATA version 10 (Statcorp LP, College Station, TX) for all statistical analyses, and defined a two-sided P value of 0.05 or less to be statistically significant for the main outcomes. Unpaired t tests were used to compare: (*1*) surrogates' personal estimates of the patient's prognosis when it was conveyed numerically versus qualitatively; and (*2*) surrogates' understanding of the physician's prognostic estimate when it was conveyed numerically versus qualitatively. A paired t test was used to compare surrogates' personal estimates of the prognosis with their understanding of the physician's prognostic estimate.

To determine which factors predicted greater discordance between surrogates' personal estimates of the prognosis and their understanding of the physician's intended prognostic estimate, we generated a linear regression model with the following variables: relationship to patient; importance of religion; physician trust; and receiving numeric rather than qualitative prognostic information. We included these variables because their coefficients had P values less than 0.2 in univariate analyses. Component plus residual plots confirmed approximately linear relationships between predictors and the outcome. All other demographic variables—age, sex, race (White versus non-White), education (≤high school, some college or college degree, or some postgraduate education or postgraduate degree), English comprehension (understanding English well or very well versus fairly well or not at all), and numeracy—had P values of 0.2 or greater in univariate analyses.

RESULTS

Demographic Characteristics

The demographic characteristics of surrogates did not differ significantly between study arms (Table 1). Less than half of surrogates had obtained a college degree.

Surrogates' Personal Estimates of the Patient's Prognosis

There was no significant difference in surrogates' personal estimates of the patient's prognosis between the two groups. Surrogates receiving numeric prognostic estimates reported a mean chance of survival of 22% (SD, 23%). Surrogates receiving qualitative prognoses reported a mean chance of survival of 26% (SD, 24%). The difference in means was not significant ($P = 0.26$), nor was precision improved with numeric prognostic statements ($P = 0.71$), as assessed by comparing the SDs of the two groups. Both groups demonstrated marked variability, with personal estimates in each group ranging from 0 to 100% survival.

Surrogates' Understanding of Physician's Prognostication

Understanding of the prognosis that the physician intended to convey did not differ between surrogates receiving numeric versus those receiving qualitative prognostic statements (mean estimated chance of survival, 17 ± 22% versus 16 ± 17%, respectively; $P = 0.62$). Again, both groups demonstrated marked variability, but with slightly less variability in the group receiving qualitative prognostic statements (SD, 22 versus 17; $P = 0.05$).

TABLE 1. DEMOGRAPHIC FEATURES OF SURROGATES WHO RECEIVED NUMERIC VERSUS QUALITATIVE PROGNOSTIC ESTIMATES

Characteristics	Numeric ($n = 83$)	Qualitative ($n = 86$)	P Value
Mean age, yr ± SD	51 ± 14	53 ± 16	0.48*
Male sex	37	38	0.96†
Race			
Hispanic	16	12	
Non-Hispanic	67	74	0.35†
Asian	5	6	
African American	4	5	
White	55	61	
Native American	0	3	
Pacific Islander	1	3	
Multiethnic/mixed	13	7	
Don't know/no response	5	1	0.18†
Education			
Less than high school degree	3	1	
High school degree	17	19	
Some college	22	24	
College degree	21	18	
Some postgraduate education	5	4	
Postgraduate or professional degree	14	20	0.74†
Mean numeracy score (0–3) ± SD	1.5 ± 0.99	1.4 ± 1.1	0.64*
Religion			
Christian	51	53	0.45†
Catholic	23	18	
Buddhist	3	1	
Hindu	1	1	
Muslim	0	1	
Jewish	1	2	
Mormon	2	1	
Wiccan	0	1	
None	15	21	
No response	9	5	0.69†
Relationship to patient			
Spouse/partner	31	35	
Child	27	18	
Sibling	9	11	
Friend	0	2	
Parent	9	14	
Other relative	4	5	
Other	3	0	0.23†

* Unpaired t test.
† Chi-square test.

For subjects who received the numeric prognostic estimate, only 52% correctly reported the prognosis that the physician conveyed (10% chance of survival).

Discordance between Understanding and Personal Estimates

In both groups overall, there was a significant difference between surrogates' understanding of the physician's prognostication and their personal estimates of the patient's prognosis ($P < 0.0001$). Surrogates' average understanding of the physician's prognostic estimate was 16 (±19)%, whereas surrogates believed the patient's chance of survival was 23 (±22)%, which was more than twice the prognostic estimate presented in the video (10% chance of survival). A total of 47% of surrogates believed the patient's prognosis was better than the prognosis conveyed by the physician; 21% of surrogates were 20 percentage points or more optimistic about the prognosis than their understanding of the physician's estimate; and 15% were more pessimistic than their understanding of the physician's prognostic estimate.

Univariate analyses identified four predictors of discordance between surrogates' understanding of the physician's prognostic estimate and their estimate of the patient's prognosis (Table 2). A linear regression model incorporating these four predictors demonstrated that greater trust in their loved one's physicians was associated with less discordance (coefficient = −0.85; $P = 0.04$) (Table 3). Conveying the prognosis numerically was also associated with less discordance (coefficient = −9.2; $P = 0.001$) (Table 3).

DISCUSSION

Numeric statements were no better than qualitative statements when disclosing news of a poor prognosis to surrogates. Regardless of whether numeric or qualitative terms were used, surrogates' personal estimates of the patient's prognosis were significantly more optimistic than their understanding of the physician's prognostication. This discordance was greater among surrogates with less trust in physicians.

Several studies have reported that lay persons and clinicians interpret qualitative prognostic statements in highly variable ways (4, 5, 21, 26). This has led some to speculate that numeric prognostic estimates might convey prognostic information more reliably (4, 5). Before the current study, only one study had addressed this question directly. Man-Son-Hing and colleagues (27) tested whether communicating risk with numeric versus qualitative terms affected subjects' understanding of the risk of stroke and major bleeding from anticoagulation for atrial fibrillation. They found that numeric terms improved subjects' ability to quantify risk on a numeric scale, but led to no difference in rank ordering the risk associated with each treatment option.

What may explain the somewhat surprising finding that numeric expressions appear to be no more effective than qualitative expressions in communicating prognosis? In contrast to prior studies in which volunteers were asked to interpret an isolated prognostic statement (4, 5, 26), we situated the prognostic statements in the context of a goals-of-care discussion between physicians and surrogates, which generally requires surrogates to assess and understand multiple pieces of information in a relatively short amount of time. This approach more closely mirrors actual practice, and is a more difficult task than scrutinizing a single prognostic statement. In addition, we tested surrogates during the highly stressful circumstances of actually serving as a surrogate decision maker for a critically ill patient. It is possible that these factors diluted any potential benefit of quantitative precision observed in "laboratory"-based experiments of risk communication (4, 5, 26).

We also found significant discordance—in the direction of optimism—between surrogates' personal estimates of the patient's prognosis and their understanding of the physician's prognostication. When asked what the physician's prognostic estimate was, surrogates were, on average, off by only 6%, which seems unlikely to represent a clinically significant difference. In contrast, when asked what they thought the prognosis was, surrogates, on average, estimated that the patient was more than twice as likely to survive as the physician did. Appelbaum and colleagues (28, 29) have previously described the conceptual distinction between "understanding" and "appreciation," but we are aware of no other empirical data confirming that such a distinction exists in the clinical context. Our data raise the possibility that the physician–surrogate discordance about prognosis observed in prior studies (1, 2) may not be fully explained by poor communication. Other factors, such as the need to express optimism (11), skepticism about physicians' abilities to predict the future, different belief systems about illness (8), or distrust of physicians, may also explain the discordance.

Surrogates with less trust in physicians had greater discordance between their understanding of the physician's prognostications and their own prognostic estimate. This finding provides empirical evidence for an association between the

TABLE 2. UNIVARIATE ANALYSES OF DISCORDANCE BETWEEN SURROGATES' PROGNOSTIC ESTIMATE AND SURROGATES' UNDERSTANDING OF PHYSICIAN'S PROGNOSTIC ESTIMATE

	Coefficient	*P* Value	95% Confidence Interval
Age ($n = 125$)	0.08	0.35	−0.09 to 0.26
Male sex ($n = 125$)	−0.13	0.96	−5.7 to 5.4
White race ($n = 123$)	−2.3	0.46	−8.4 to 3.8
Education ($n = 124$)			
⩽High school degree	1 (Reference)	—	—
Some college education or college degree	2.9	0.42	−4.1 to 9.9
Some postgraduate education or more	−1.7	0.67	−9.7 to 6.3
Understands English well or very well ($n = 125$)	6.6	0.31	−6.3 to 19.5
Christian ($n = 114$)	2.2	0.49	−4.1 to 8.6
Relationship to patient ($n = 124$)*			
Spouse/partner	1 (Reference)	—	—
Child	−6.1	0.07	−12.8 to 0.59
Other	2.9	0.37	−3.6 to 9.4
Religiosity ($n = 121$)*	1.9	0.16	−0.80 to 4.6
Trust in patient's physician ($n = 125$)*	−0.80	0.06	−1.6 to 0.02
Trust in physician in video ($n = 125$)	−0.37	0.77	−2.8 to 2.1
Numeracy ($n = 125$)	−0.67	0.63	−3.3 to 2.0
Receiving prognostic information in numbers ($n = 125$)*	−9.7	0.001	−15 to −4.4

* Univariate predictors (with $P < 0.2$) were included in the multivariate analysis.

quality of the physician–family relationship and the degree to which surrogates incorporate physicians' expertise into their considerations. Physicians in ICUs often have no prior relationship with their patients, and, therefore, must establish their trustworthiness quickly and under very stressful circumstances (30, 31). Further research is needed to identify ways for ICU physicians to better establish trust with families under these challenging circumstances.

Our study has several limitations. First, we did not assess whether misperceptions about prognosis affected decisions to continue life-sustaining treatment. Second, although the sample was diverse, there was insufficient power to analyze subgroups robustly based on factors such as religiosity and numeracy. Third, the findings are limited to discussing poor prognoses. It is possible that the same psychological phenomena do not occur when the prognosis is favorable. Fourth, the method of outcome assessment may have favored greater precision in the numeric prognosis group by using a numeric probability scale to measure surrogates' prognostic estimates. If so, one would expect to find the numeric group's prognostic understanding and personal estimates to be more accurate and precise compared with those of the qualitative group. We found no such difference. Fifth, discordance between surrogates' own prognostic estimates and their understanding of the physician's prognostic estimate was measured in only 126 of 169 participants. However, the subgroup of 126 participants was still randomly assigned to receive either a qualitative or numeric prognosis, and demographic characteristics were not significantly different between the two groups.

Regardless of whether numeric or qualitative terms were used to convey poor prognosis, surrogates' prognostic estimates were, on average, more than twice as optimistic as the physician's prognostic estimate. This discordance was greater for surrogates with less trust in physicians. To improve discussions about prognosis in ICUs, we speculate that successful interventions will need to address both the cognitive and emotional aspects of discussing a poor prognosis. Cognitive interventions should target clearly conveying prognostic information (e.g., visual aids, checking behaviors, teach-backs, and multiple conversations). Emotional and psychological interventions should foster trust between clinicians and family, and provide emotional support to family members for coming to terms with the news of a poor prognosis.

Until data are available to support specific interventions, we propose that physicians should explicitly check whether surrogates have understood the information presented. Such "checking behaviors" are advocated broadly in medicine, and have improved patients' self-management of chronic diseases, such as diabetes (32), but are rarely used in ICUs (33). If there appears to be disagreement regarding the patient's prognosis, we also suggest that clinicians inquire about the surrogate's beliefs about disease and prognosis. Questions geared toward understanding different explanatory models of illness may help elucidate factors beyond ineffective communication that contribute to discordance about prognosis (34).

TABLE 3. MULTIVARIATE ANALYSIS PREDICTING DISCORDANCE BETWEEN SURROGATES' PROGNOSTIC ESTIMATE AND SURROGATES' UNDERSTANDING OF PHYSICIAN'S PROGNOSTIC ESTIMATE ($N = 120$)

Characteristics	Coefficient	*P* Value	95% Confidence Interval
Relationship to patient			
Spouse/partner	1 (Reference)	—	—
Child	−4.5	0.18	−11.1 to 2.1
Other	2.7	0.39	−3.6 to 9.1
Religiosity	1.6	0.24	−1.1 to 4.2
Trust in patient's physician	−0.85	0.04	−1.7 to −0.04
Receiving prognostic information in numbers	−9.2	0.001	−14.5 to −3.8

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References

1. Cox CE, Martinu T, Sathy SJ, Clay AS, Chia J, Gray AL, Olsen MK, Govert JA, Carson SS, Tulsky JA. Expectations and outcomes of prolonged mechanical ventilation. *Crit Care Med* 2009;37:2888–2894.

2. Teno JM, Fisher E, Hamel MB, Wu AW, Murphy DJ, Wenger NS, Lynn J, Harrell FE Jr. Decision-making and outcomes of prolonged ICU stays in seriously ill patients. *J Am Geriatr Soc* 2000;48(5 Suppl)S70–S74.
3. Azoulay E, Chevret S, Leleu G, Pochard F, Barboteu M, Adrie C, Canoui P, Le Gall JR, Schlemmer B. Half the families of intensive care unit patients experience inadequate communication with physicians. *Crit Care Med* 2000;28:3044–3049.
4. Nakao MA, Axelrod S. Numbers are better than words: verbal specifications of frequency have no place in medicine. *Am J Med* 1983;74: 1061–1065.
5. Robertson WO. Quantifying the meanings of words. *JAMA* 1983;249: 2631–2632.
6. Edwards A, Matthews E, Pill R, Bloor M. Communication about risk: diversity among primary care professionals. *Fam Pract* 1998;15:296–300.
7. White DB, Engelberg RA, Wenrich MD, Lo B, Curtis JR. Prognostication during physician–family discussions about limiting life support in intensive care units. *Crit Care Med* 2007;35:442–448.
8. Zier LS, Burack JH, Micco G, Chipman AK, Frank JA, Luce JM, White DB. Doubt and belief in physicians' ability to prognosticate during critical illness: the perspective of surrogate decision makers. *Crit Care Med* 2008;36:2341–2347.
9. Zier LS, Burack JH, Micco G, Chipman AK, Frank JA, White DB. Surrogate decision makers' responses to physicians' predictions of medical futility. *Chest* 2009;136:110–117.
10. Gattellari M, Butow PN, Tattersall MH, Dunn SM, MacLeod CA. Misunderstanding in cancer patients: why shoot the messenger? *Ann Oncol* 1999;10:39–46.
11. Weinfurt KP, Sulmasy DP, Schulman KA, Meropol NJ. Patient expectations of benefit from phase I clinical trials: linguistic considerations in diagnosing a therapeutic misconception. *Theor Med Bioeth* 2003; 24:329–344.
12. White DB, Evans LR, Bautista CA, Luce JM, Lo B. Are physicians' recommendations to limit life support beneficial or burdensome? Bringing empirical data to the debate. *Am J Respir Crit Care Med* 2009;180:320–325.
13. Curtis JR, Engelberg RA, Wenrich MD, Nielsen EL, Shannon SE, Treece PD, Tonelli MR, Patrick DL, Robins LS, McGrath BB, *et al.* Studying communication about end-of-life care during the ICU family conference: development of a framework. *J Crit Care* 2002;17:147–160.
14. Curtis JR, Engelberg RA, Wenrich MD, Shannon SE, Treece PD, Rubenfeld GD. Missed opportunities during family conferences about end-of-life care in the intensive care unit. *Am J Respir Crit Care Med* 2005;171:844–849.
15. Curtis JR, Patrick DL, Shannon SE, Treece PD, Engelberg RA, Rubenfeld GD. The family conference as a focus to improve communication about end-of-life care in the intensive care unit: opportunities for improvement. *Crit Care Med* 2001;29(2 Suppl): N26–N33.
16. Curtis JR, Wenrich MD, Carline JD, Shannon SE, Ambrozy DM, Ramsey PG. Understanding physicians' skills at providing end-of-life care perspectives of patients, families, and health care workers. *J Gen Intern Med* 2001;16:41–49.
17. Lautrette A, Darmon M, Megarbane B, Joly LM, Chevret S, Adrie C, Barnoud D, Bleichner G, Bruel C, Choukroun G, *et al.* A communication strategy and brochure for relatives of patients dying in the ICU. *N Engl J Med* 2007;356:469–478.
18. Stapleton RD, Engelberg RA, Wenrich MD, Goss CH, Curtis JR. Clinician statements and family satisfaction with family conferences in the intensive care unit. *Crit Care Med* 2006;34:1679–1685.
19. White DB, Curtis JR. Establishing an evidence base for physician-family communication and shared decision making in the intensive care unit. *Crit Care Med* 2006;34:2500–2501.
20. Weeks JC, Cook EF, O'Day SJ, Peterson LM, Wenger N, Reding D, Harrell FE, Kussin P, Dawson NV, Connors AF Jr, *et al.* Relationship between cancer patients' predictions of prognosis and their treatment preferences. *JAMA* 1998;279:1709–1714.
21. Kong A, Barnett GO, Mosteller F, Youtz C. How medical professionals evaluate expressions of probability. *N Engl J Med* 1986;315:740–744.
22. Bryant GD, Norman GR. Expressions of probability: words and numbers. *N Engl J Med* 1980;302:411.
23. Cliff N. Adverbs as multipliers. *Psychol Rev* 1959;66:27–44.
24. Schwartz LM, Woloshin S, Black WC, Welch HG. The role of numeracy in understanding the benefit of screening mammography. *Ann Intern Med* 1997;127:966–972.
25. Dugan E, Trachtenberg F, Hall MA. Development of abbreviated measures to assess patient trust in a physician, a health insurer, and the medical profession. *BMC Health Serv Res* 2005;5:64.
26. Mazur DJ, Hickam DH. Patients' interpretations of probability terms. *J Gen Intern Med* 1991;6:237–240.
27. Man-Son-Hing M, O'Connor AM, Drake E, Biggs J, Hum V, Laupacis A. The effect of qualitative vs. quantitative presentation of probability estimates on patient decision-making: a randomized trial. *Health Expect* 2002;5:246–255.
28. Appelbaum PS, Roth LH. Competency to consent to research: a psychiatric overview. *Arch Gen Psychiatry* 1982;39:951–958.
29. Berg JW, Appelbaum PS. Informed consent: legal theory and clinical practice, 2nd ed. Oxford; New York: Oxford University Press; 2001.
30. Chaitin E, Stiller R, Jacobs S, Hershl J, Grogen T, Weinberg J. Physician-patient relationship in the intensive care unit: erosion of the sacred trust? *Crit Care Med* 2003;31(5 Suppl)S367–S372.
31. Tarn DM, Meredith LS, Kagawa-Singer M, Matsumura S, Bito S, Oye RK, Liu H, Kahn KL, Fukuhara S, Wenger NS. Trust in one's physician: the role of ethnic match, autonomy, acculturation, and religiosity among Japanese and Japanese Americans. *Ann Fam Med* 2005;3:339–347.
32. Schillinger D, Piette J, Grumbach K, Wang F, Wilson C, Daher C, Leong-Grotz K, Castro C, Bindman AB. Closing the loop: physician communication with diabetic patients who have low health literacy. *Arch Intern Med* 2003;163:83–90.
33. White DB, Engelberg RA, Wenrich MD, Lo B, Curtis JR. The language of prognostication in intensive care units. *Med Decis Making* 2010;30: 76–83.
34. Kleinman A, Eisenberg L, Good B. Culture, illness, and care: clinical lessons from anthropologic and cross-cultural research. *Ann Intern Med* 1978;88:251–258.