

Patient Literacy and Question-asking Behavior During the Medical Encounter: A Mixed-methods Analysis

Marra G. Katz, BS¹, Terry A. Jacobson, MD¹, Emir Veledar, PhD¹, and Sunil Kripalani, MD, MSc¹

¹Emory University School of Medicine, Atlanta, Georgia 30303, USA.

BACKGROUND: Although patient participation in the medical encounter confers significant benefits, many patients are reluctant to ask questions of their physicians. Patients' literacy level may affect their level of participation and question-asking behaviors.

OBJECTIVE: To examine the effect of literacy on the number and types of questions asked by patients during primary care office visits.

DESIGN: Convenience sample recruited between April and November 2004. Physician-patient visits were audiotaped, and patient questions from complete encounters (N=57) were coded using an adaptation of the Roter Interaction Analysis System.

PATIENTS: Participants were predominantly middle-aged (mean age=56.7 years), female (75.4%), and African American (94.7%). Low literacy skills (\leq 6th grade reading level) were present in 38.6%.

MEASUREMENTS: We hypothesized prospectively that low-literacy patients would ask fewer total questions and fewer questions about key aspects of their medical care.

RESULTS: Low-literacy adults asked significantly fewer questions about medical care issues (median=4 vs 6 among patients with higher literacy levels, $p=.014$). They also tended to ask fewer questions overall (median=7 vs 10, $p=.070$). Low-literacy patients were more likely to ask the physician to repeat something ($p=.013$), indicating an initial lack of understanding. They were less likely to use medical terminology, refer to medications by name, request additional services, or seek new information. Question-asking behavior was not significantly related to patient gender, age, years of education, or physician-patient gender concordance.

CONCLUSIONS: Literacy level appears to be an important determinant of patients' participation in the medical encounter. Low-literacy patients ask fewer questions about their medical care, and this may affect their ability to learn about their medical conditions and treatments.

KEY WORDS: literacy; patient participation; patient activation; physician-patient communication.

DOI: 10.1007/s11606-007-0184-6

© 2007 Society of General Internal Medicine 2007;22:782-786

Over the past few decades, there has been a shift in the patient-provider relationship toward enabling patients to actively participate in their medical care, through asking questions, requesting medications and other services, and shared decision making.¹⁻⁴ Patient activation has proven to enhance patient satisfaction, perceived health, and adherence; decrease patients' anxiety levels; and improve diabetes and hypertension management.⁵⁻⁸ Additionally, patients who ask more questions are more likely to elicit useful information from their physicians,^{9, 10} which consequently leads to an increase in self-efficacy and a greater sense of control over their care.¹¹ Despite the fact that patient activation confers significant benefits,^{2,5-8,12} prior research has shown that patient questions make up only about 7% of patient dialogue, which corresponds to 3-9 questions per visit.^{13,14}

Patients may feel reluctant to ask their physicians questions for several reasons. In broad terms, patients with diminished feelings of self-efficacy and those who view the physician as the "decision maker" are hesitant to express their opinions and to ask questions.^{1,15-17} Consequently, physician encouragement, in the form of partnership-building and supportive talk, actually fosters patient participation.^{1,16-20}

Patients' sociodemographic characteristics are also important predictors of their willingness to participate in the medical encounter. According to prior studies, non-White, working class, and less educated patients are less likely to participate actively in the medical visit.^{10,17,20} Some research indicates that older patients tend to ask more questions,¹³ whereas other studies show the opposite.^{16,20}

Low literacy is another factor that may impact patients' participation in the medical encounter.^{21,22} Literacy is a functional and context-specific skill that includes oral skills (listening and speaking) and print-based skills (reading and writing).²³ The Institute of Medicine recently estimated that 90 million adult Americans lack the literacy skills needed to effectively obtain, understand, and act on health information.²³ Patients with low literacy have less knowledge about their medical illnesses and more difficulty navigating the health care system.^{24,25} Rather than actively seeking aid, many such patients become ashamed of their challenges and avoid situations that might reveal their limited understanding.²⁶ Research is only beginning to assess how patients' literacy skills affect the dynamics of the physician-patient interaction.^{22,27,28}

Received August 8, 2006

Revised November 29, 2006

Accepted March 16, 2007

Published online April 12, 2007

In this exploratory study, we examined the number and type of questions asked by patients in routine office visits, using a combination of quantitative and qualitative methods. We hypothesized that patients with lower literacy skills would ask fewer total questions and perhaps, more significantly, fewer questions about key aspects of their medical care than their high literacy counterparts.

METHODS

Study Design and Sample

The study took place in the primary care clinic at Grady Memorial Hospital (GMH) in Atlanta, Georgia. GMH is an urban teaching hospital, which serves a largely indigent, African-American population. Internal Medicine residents and faculty from Emory University School of Medicine provide care in the clinic. The study was approved by the Emory Institutional Review Board and the Grady Research Oversight Committee.

Between April and November 2004, patients arriving for a scheduled appointment were invited to participate in a study of physician–patient communication involving an audiotape of the appointment followed by a brief interview. To be eligible, patients were required to speak English, have a visual acuity better than 20/60, as assessed by a pocket screening card, and be scheduled to see 1 of 21 Internal Medicine residents who had already provided consent to be audio-taped as part of a larger study.²⁹ Participating patients also provided written consent. They received \$5 compensation.

Of approximately 130 patients approached to participate in the parent study, 102 were enrolled and audio-taped. The full office visit was successfully recorded for 57 patients, and these make up the study sample. The remaining recordings were nearly complete, but lacked the beginning or end of the visit (e.g., the physician and patient were already talking when they entered the examination room, or the tape ended while the resident was discussing the patient with an attending physician).

Data Collection

Medical appointments were audio-taped using a simple cassette recorder and extension microphone located in the examination room. The tape recorder was started before the physician and patient entered the room. After the visit, the patient completed an interviewer-assisted questionnaire, which included the Rapid Estimate of Adult Literacy in Medicine (REALM).³⁰ The REALM is the most commonly used measure of literacy in the health care setting.³¹ It is a 66-item word pronunciation test, which is commonly scored as \leq 3rd grade reading level (score 0–18), 4th–6th grade (19–44), 7th–8th grade (45–60), or \geq 9th grade (61–66). We grouped scores as low (0–44) or higher (45–66). Subjects also provided their race, gender, age, and years of school completed.

The cassette tapes were transcribed by an outside service, which masked the names of the physician and patient. Because the transcripts were organized only by study identification number, coders were effectively blinded to the subjects' literacy level and other characteristics.

Transcript Coding

Transcripts were coded using an adaptation of the Roter Interaction Analysis System (RIAS), a method widely used to study physician–patient dialog.³² Researchers using the RIAS traditionally assign one code to each utterance made by the patient or provider based on both content and context. An utterance is defined as a complete thought, usually a sentence or a phrase. The RIAS contains 42 sociobehavioral categories for coding utterances, including 16 categories that can be used to code questions.³³

We developed minor adaptations of the RIAS to maximize its usefulness for coding patient questions. First, the utterances we analyzed were complete questions, defined as a request for information, clarification, or services. Where appropriate, requests framed either in an interrogative form or as a statement were accepted. (See example 4 in Table 1.) Second, we reduced the number of categories to 11 by collapsing several of those that coded separately for open- and closed-ended questions, in part for parsimony, and in part because physicians often provided extensive responses regardless of the format of a patient's question(s). Third, we prospectively defined a *medical composite* category, which included therapeutic regimen, medical condition, lifestyle, and requests for services or medication. This combined category represents information seeking about key medical aspects of care. Whereas use of this exact combination has not been reported previously, similar pooling of the RIAS domains has been performed in other studies.³³

Coding was performed on printed transcripts by one trained member of the research team who tabulated the number of questions in each defined category. To maximize reliability, another investigator reviewed the first 20 coded transcripts for accuracy and discussed any discrepancies with the coder. After developing consistent agreement, the trained coder individually scored the remaining transcripts.

Statistical Analysis

Descriptive statistics were used to analyze patient characteristics, including gender, age, years of education, and literacy level. Characteristics of the physician–patient encounter were summarized with descriptive statistics about the transcript length, including word count and sentence count. Patient questions were tabulated by each of the 11 categories and composite category.

Univariate analyses examined the relationship of patient characteristics and physician–patient gender concordance with question-asking, treating the medical composite category as the primary outcome of interest. We used Student's *t* test for parametric comparisons and the median two-sample for nonparametric data. We also computed the percentage of questions in each encounter that were medically related (medical composite divided by total questions) and compared differences by literacy level using Student's *t* test. Analyses were performed with SPSS version 13.0 for Windows and S-Plus version 6.2. Alpha was set at 0.05 (one-sided).

Qualitative Analysis

To better understand qualitative differences in patient question content, a trained research team member with a back-

Table 1. Categories Used for Coding Patient Questions

Category	Description	Example
1. Therapeutic regimen	Questions relating to past, ongoing, and future treatment, including medication regimen and lifestyle controls	"How often should I take these pills?"
2. Medical condition	Questions about past medical and family history, physical condition, and practices related to the medical condition (ex: diagnostic tests)	"Why do I get these stomach pains?"
3. Lifestyle	Questions about diet, sleep, alcohol, and exercise habits, family and home situations, work, prevention and self-care, and cost issues	"How far should I walk each day?"
4. Requests for services or medications	Patient-initiated requests for services, credentialing, treatment, test, referral, or medication	"Can you give me another prescription for my heart pills?" "I wonder if I could get more of these pills for my headaches."
5. Psychosocial/feelings	Questions pertaining to the psychological or emotional state (ex: related to emotions, worries, concerns, feelings of stress)	"Is stress causing my chest pain?"
6. Nonmedical/ procedural (i.e., other)	Questions related to clinic paperwork, exam or study procedures, etc. which do not fit into one of the above	"Should I take off my shirt?"
7. Asks for understanding	Questions used to check the other's understanding of the information that was just said (includes asking for agreement)	"Do you understand?"
8. Asks for reassurance	Questions of concern that convey the need or desire to be reassured or encouraged	"Do you think it's serious?"
9. Paraphrase/checks for understanding	Mechanism by which the speaker restates or reflects back information he or she has been told for the purpose of checking the accuracy of the information or to confirm a shared understanding	Dr: "Your blood pressure is high." Pt: "It is?"
10. Bid for repetition	Asking for repetition of the other's previous statement because it was not clearly heard (directly follows the statement needing repetition)	"What did you say?"
11. Personal remarks/social conversation	Greetings, return of friendly gestures, conversation on weather, sports or any other nonmedical or social topic	"How are you?"
12. Medical composite	Sum of all questions meeting criteria for categories 1-4	

ground in qualitative methods compiled a list of all questions coded in the medical composite category. The questions were divided into 2 groups: those asked by low-literacy patients, and those asked by patients with higher literacy levels. The question sets were examined for any variations in content (e.g., assimilation of information, initiation of a new topic) and language (e.g., use of medical jargon).

RESULTS

Patient and Transcript Characteristics

The population ($N=57$) was predominantly female (75.4%), middle-aged (mean=56.7 years, $SD=12.9$, range=31-86), and African American (94.7%). Approximately half of participants had achieved a high school education (mean years of school completed=11.4, $SD=2.3$, range=3-16). A large percentage (36.8%, $N=21$) read at or below the 6th grade level as determined by the REALM. The study sample was reflective of the overall clinic population.

The physician-patient encounters were approximately 30-45 minutes in length, corresponding to a mean transcript length of 3,235 words ($SD=1,182$, range=1,390-6,654) or 401 sentences ($SD=142$, range=187-756).

Quantitative Results

Patients asked a mean of 12.2 questions ($SD=10.3$, median = 9, range=1-47). The distribution of questions overall and by category was nonparametric. Patients most frequently asked questions about their therapeutic regimen, medical condition, and nonmedical/procedural issues. The least common types of questions asked were those pertaining to psychosocial issues, requests for reassurance, and personal remarks (see Table 2).

Overall, low-literacy patients tended to ask fewer questions than their higher-literacy counterparts (median=7 vs 10), but this association did not reach statistical significance ($p=.070$; see Table 2.) Low-literacy patients asked significantly fewer questions about the key medical aspects of their care (medical composite category, median=4 vs 6, $p=.014$), caused in part by fewer queries about lifestyle modification (median=0 vs 1, $p=.001$). The percentage of total questions in the medical composite category also tended to be lower among low-literacy patients (53.1% vs 62.5%), but this effect was not statistically significant ($p=.082$).

The number of questions in most other categories tended to be higher among patients with better literacy skills, with the exception of bids for repetition, personal remarks, and non-medical/procedural questions. Bids for repetition, defined as asking the physician to repeat a statement, were significantly more common among low-literacy patients ($p=.013$).

There were no statistically significant differences in total questions or medical questions by patient age, gender, or years of schooling, or by the presence or absence of physician-patient gender concordance.

Qualitative Results

Qualitative analysis produced several noteworthy findings. Low-literacy patients' bids for repetition frequently took the form of short questions that indicated lack of understanding, such as, "My what?" or "Who?" These types of questions did not appear to facilitate the communication of new or meaningful information. Additionally, the questions asked by low-literacy patients often concerned basic procedural issues rather than an attempt to seek new medical information, for example, "Where do I get my blood drawn at?" or "Could I come back tomorrow and give the urine test?"

Table 2. Distribution of Patient Questions Overall and by Literacy Level

	Overall (N=57)	Low literacy (N=21)	Higher literacy (N=36)
	Mean (SD); median (range)	Mean (SD); median (range)	Mean (SD); median (range)
Therapeutic regimen	3.3 (4.5); 2.0 [0–20]	2.9 (4.8); 1.0 [0–20]	3.5 (4.4); 2.0 [0–18]
Medical condition	2.6 (2.7); 2.0 [0–14]	2.0 (2.1); 2.0 [0–9]	3.0 (3.0); 2.0 [0–14]
Lifestyle	0.9 (1.6); 0.0 [0–9]	0.2 (0.5); 0.0 [0–2]	1.3 (1.9); 1.0 [0–9]*
Requests for services or medications	0.8 (1.2); 0.0 [0–5]	0.6 (1.0); 0.0 [0–4]	1.0 (1.3); 0.0 [0–5]
Psychosocial/feelings	0.2 (0.4); 0.0 [0–2]	0.1 (0.4); 0.0 [0–1]	0.2 (0.5); 0.0 [0–2]
Non-medical/Procedural	1.5 (2.4); 1.0 [0–11]	1.8 (2.8); 1.0 [0–11]	1.4 (2.2); 1.0 [0–10]
Asks for understanding	0.7 (1.7); 0.0 [0–8]	0.2 (0.5); 0.0 [0–2]	0.9 (2.1); 0.0 [0–8]
Asks for reassurance	0.3 (0.8); 0.0 [0–4]	0.1 (0.3); 0.0 [0–1]	0.4 (1.0); 0.0 [0–4]
Paraphrase/checks for understanding	1.2 (1.2); 1.0 [0–6]	1.1 (1.4); 1.0 [0–6]	1.2 (1.0); 1.0 [0–4]
Bid for repetition	0.4 (0.8); 0.0 [0–5]	0.7 (1.1); 0.0 [0–5]	0.2 (0.4); 0.0 [0–1]**
Personal remarks/social conversation	0.3 (0.7); 0.0 [0–3]	0.4 (0.8); 0.0 [0–3]	0.3 (0.6); 0.0 [0–2]
Medical composite	7.6 (7.2); 6.0 [0–27]	5.7 (6.4); 4.0 [0–27]	8.7 (7.5); 6.0 [0–27]**
Total questions	12.2 (10.3); 9.0 [1–47]	10.2 (8.8); 7.0 [1–38]	13.3 (11.0); 10.0 [1–47]

Medical composite includes therapeutic regimen, medical condition, lifestyle, and requests for services or medications.

*p=0.001

**p<0.05

Patients in both low and higher literacy groups asked questions pertaining to current medications, including questions about dosage, timing, and side effects (e.g., “Don’t take it twice a day?” or “So this one will make you go to the bathroom a lot?” or “I need a prescription for that?”). However, higher literacy patients were much more likely to refer to medications by trade name and to use medical terminology (see Table 3.) Patients with higher literacy levels also raised other concerns related to self-management of medical conditions, specifically questions related to lifestyle issues (e.g., “You can eat them when you’re a diabetic?” or “At this point, what would be more important, the diet or the exercise?” or “If I’m not sexually active, I still have to take it?”). Additionally, patients with higher literacy skills more frequently inquired about additions or changes to the medication regimen, or requested additional services (e.g., “This is what I want to ask you...I said maybe I need to take a purple pill.” or “I can’t take the Paxil. I was going to ask you about this, the Zelnorm.” or “Can I get a referral to the eye clinic, too?”).

DISCUSSION

Question-asking has emerged as an important measure of active patient participation in the medical encounter.^{4–6, 13} In this mixed-methods analysis of patient questions asked during a primary care visit, low-literacy patients asked significantly

fewer questions about key aspects of medical care. The total number of questions asked by patients also tended to be lower among low-literacy patients, but it was bolstered somewhat by a higher rate of questions seeking repetition or clarification from the physician. To our knowledge, this is the first study to assess the relationship between literacy and question-asking in medical encounters.

The qualitative aspect of this study revealed variation in the types of questions asked by patients of different literacy levels. As such, it permits a more meaningful assessment of the nature of patient questions than could be obtained by quantitative means alone.¹⁴ For example, whereas quantitative results showed that both groups asked a similar number of questions about their medication and their specific medical condition, qualitative evaluation indicated that patients with higher literacy levels were more likely to use medical terminology, such as medication trade names and jargon terms, and to inquire about alternative treatment options. Overall, more literate patients tended to explore medical issues beyond their immediate medical complaint and asked more probing medical questions than did their lower literacy counterparts.

Interestingly, low-literacy patients were significantly more likely to ask their physician to repeat something that was just stated (“bids for repetition”) than were patients with higher literacy skills. This finding is consistent with prior research, which has demonstrated that low-literacy patients often have greater difficulty understanding health information,^{22, 23} creating a greater need to ask for clarification. Whereas it may be more beneficial for patients to ask questions that demonstrate comprehension of previously stated information and that seek new knowledge, requesting repetition of a poorly understood statement does add some value and is far better than not asking a question at all.

This preliminary investigation has several limitations that generate questions for future study. First, the sample size was relatively small and this limited the statistical power of the comparisons. It is important to note that individual patients may exhibit a greater inclination toward active participation than others; a larger sample size would be helpful in limiting the effect of individual variation on statistical results. Second, our qualitative findings are by nature subjective and should be substantiated by future study. The qualitative analyses were

Table 3. Examples of Differences in Medical Questions Asked by Low-Literacy vs Higher Literacy Patients

Difference	Low literacy	Higher literacy
Use of drug names	Yeah, and that medicine right there, what is the name? I thought this one was the water pill.	But will I be in any danger with the increase of Lisinopril? Did I say Glipizide?
Use of medical terminology	How many times is she going to get my sugar? Is that why my pressure is still high?	Could osteoporosis have something to do with that too? Did they check my thyroid?

conducted using the available sample of transcripts, rather than to a saturation point. Third, we were unable to control for other unmeasured characteristics that have been shown to contribute to variations in question-asking, namely, self-efficacy, physician behavior, and cultural differences.^{1,16-20} It is possible that unmeasured factors such as these mediate the observed relationship between literacy and question-asking behavior. Fourth, because the patient population was comprised predominately of African Americans in an inner-city clinic, the findings may not generalize to other groups. Fifth, the medical visits studied were longer than typical medical encounters. As a result, the number of questions observed in this study may exceed those asked in shorter office visits. It is unclear what effect literacy may have on question-asking behavior in physician-patient encounters of different durations.

In conclusion, literacy level is an important determinant of patients' participation in the medical visit. Low-literacy patients ask fewer questions about key medical issues and are less likely to seek out new information. These behaviors may reduce patients' ability to learn about their medical conditions and treatments and contribute to lower disease-related knowledge. Physicians should actively encourage patient participation in the clinical encounter, particularly when limited literacy skills are suspected.

Acknowledgments: We thank Samatha Brown and Melissa Love-Ghaffari for their assistance with data collection and management. Supported by a Pfizer Health Literacy Scholar Award, a K12 grant from NIH National Center for Research Resources (K12 RR017643), a K23 Mentored Patient-Oriented Research Career Development Award (K23 HL077597) to Dr. Kripalani, and in part by the National Center on Minority Health and Health Disparities Project EXPORT and the Georgia Cancer Center for Excellence at Grady Health System (NMCHD 5P60-MD000525).

Conflict of Interest: None disclosed.

Corresponding Author: Sunil Kripalani, MD, MSc; Division of General Medicine, Emory University School of Medicine, 49 Jesse Hill Jr Dr SE, Atlanta, Georgia 30303, USA (e-mail: skripal@emory.edu).

REFERENCES

- Roter DL. Patient participation in the patient-provider interaction: the effects of patient question asking on the quality of interaction, satisfaction and compliance. *Health Educ Monogr.* 1977;5(4):281-315.
- Roter DL, Hall JA, Katz NR. Patient-physician communication: a descriptive summary of the literature. *Patient Educ Couns.* 1988;12:99-119.
- Street RL, Jr. Active patients as powerful communicators. In: **Robinson WP, Giles H, eds.** *The New Handbook of Language and Social Psychology.* Chichester (UK): John Wiley & Sons Ltd; 2001:541-60.
- Street RL, Jr., Millay B. Analyzing patient participation in medical encounters. *Health Commun.* 2001;13(1):61-73.
- Greenfield S, Kaplan SH, Ware JE, Jr., Yano EM, Frank HJ. Patients' participation in medical care: effects on blood sugar control and quality of life in diabetes. *J Gen Intern Med.* 1988;3(5):448-57.
- Harrington J, Noble LM, Newman SP. Improving patients' communication with doctors: a systematic review of intervention studies. *Patient Educ Couns.* 2004;52(1):7-16.
- Morisky DE, Bowler MH, Finlay JS. An educational and behavioral approach toward increasing patient activation in hypertension management. *J Commun Health.* 1982;7(3):171-82.
- Rost KM, Flavin KS, Cole K, McGill JB. Change in metabolic control and functional status after hospitalization: impact of patient activation intervention in diabetic patients. *Diabetes Care.* 1991;14(10):881-9.
- Street RL, Jr. Information-giving in medical consultations: the influence of patients' communicative styles and personal characteristics. *Soc Sci Med.* 1991;32(5):541-8.
- Waitzkin H. Information giving in medical care. *J Health Soc Behav.* 1985;26(2):81-101.
- Tabak ER. Encouraging patient question-asking: a clinical trial. *Patient Educ Couns.* 1988;12(1):37-49.
- Stewart MA. Effective physician-patient communication and health outcomes: a review. *CMAJ Can Med Assoc J.* 1995;152(9):1423-33.
- Kidd J, Marteau TM, Robinson S, Ukoumunne OC, Tydeman C. Promoting patient participation in consultations: a randomised controlled trial to evaluate the effectiveness of three patient-focused interventions. *Patient Educ Couns.* 2004;52(1):107-12.
- Roter D, Frankel R. Quantitative and qualitative approaches to the evaluation of the medical dialogue. *Soc Sci Med.* 1992;34(10):1097-103.
- Beisecker AE, Beisecker TD. Patient information-seeking behaviors when communicating with doctors. *Med Care.* 1990;28(1):19-28.
- Maly RC, Umezawa Y, Leake B, Silliman RA. Determinants of participation in treatment decision-making by older breast cancer patients. *Breast Cancer Res Treat.* 2004;85(3):201-9.
- Street RL, Jr., Gordon HS, Ward MM, Krupat E, Kravitz RL. Patient participation in medical consultations: why some patients are more involved than others. *Med Care.* 2005;43(10):960-9.
- Rost K, Carter W, Inui T. Introduction of information during the initial medical visit: consequences for patient follow-through with physician recommendations for medication. *Soc Sci Med.* 1989;28(4):315-21.
- Roter DL, Hall JA, Katz NR. Relations between physicians' behaviors and analogue patients' satisfaction, recall, and impressions. *Med Care.* 1987;25(5):437-51.
- Street RL, Jr., Voigt B, Geyer C, Jr., Manning T, Swanson GP. Increasing patient involvement in choosing treatment for early breast cancer. *Cancer.* 1995;76(11):2275-85.
- American Medical Association Council on Scientific Affairs. Health literacy. *JAMA.* 1999;281:552-7.
- Williams MV, Davis T, Parker RM, Weiss BD. The role of health literacy in patient-physician communication. *Fam Med.* 2002;34(5):383-9.
- Institute of Medicine. *Health Literacy. A Prescription to End Confusion.* Washington, DC: National Academies Press; 2004.
- Baker DW, Parker RM, Williams MV, et al. The health care experience of patients with low literacy. *Arch Fam Med.* 1996;5:329-34.
- Gazmararian JA, Williams MV, Peel J, Baker DW. Health literacy and knowledge of chronic disease. *Patient Educ Couns.* 2003;51(3):267-75.
- Parikh NS, Parker RM, Nurss JR, Baker DW, Williams MV. Shame and health literacy: the unspoken connection. *Patient Educ Couns.* 1996;27(1):33-9.
- Schillinger D, Bindman AB, Wang F, Stewart AL, Piette J. Functional health literacy and the quality of physician-patient communication among diabetes patients. *Patient Educ Couns.* 2004;52:315-23.
- Schillinger D, Piette J, Grumbach K, et al. Closing the loop. Physician communication with diabetic patients who have low health literacy. *Arch Intern Med.* 2003;163:83-90.
- Kripalani S, Jacobson KL, Brown S, Manning K, Rask KJ, Jacobson TA. Development and implementation of a health literacy training program for medical residents. *Med Educ Online.* 2006;11(13):1-8.
- Davis TC, Crouch MA, Long SW, et al. Rapid assessment of literacy levels of adult primary care patients. *Fam Med.* 1991;23(6):433-5.
- Davis TC, Kernen EM, Gazmararian JA, Williams MV. Literacy testing in health care research. In: **Schwartzberg JG, VanGeest JB, Wang CC, eds.** *Understanding Health Literacy.* Chicago: American Medical Association; 2005:157-79.
- Roter DL, Stewart M, Putnam SM, Lipkin M, Jr, Stiles W, Inui TS. Communication patterns of primary care physicians. *JAMA.* 1997;277:350-6.
- Roter DL. Roter Interaction Analysis System. Available at <http://www.riias.org>. Accessed July 11, 2006.