Patient health literacy and patient–physician information exchange during a visit

Hirono Ishikawa, Eiji Yano, Shin Fujimori, Makoto Kinoshita, Toshikazu Yamanouchi, Mayuko Yoshikawa, Yoshihiko Yamazaki and Tamio Teramoto


**Background.** Health literacy (HL), the capacity of individuals to access, understand and use health information to make informed and appropriate health-related decisions, is recognized as an important concept in patient education and disease management.

**Objective.** To examine the relation of three levels of HL (i.e. functional, communicative and critical HL) to patient–physician information exchange during a visit.

**Methods.** Participants were 134 outpatients with type 2 diabetes who were under continuous care by four attending physicians at a university-affiliated hospital. The visit communication was recorded and analysed using the Roter Interaction Analysis System. Patient HL was measured through a self-reported questionnaire using newly developed self-rated scales of functional, communicative and critical HL. Sociodemographic and clinical characteristics and patient’s perception of the information exchange were assessed for each patient through self-reported questionnaires and review of electronic medical records.

**Results.** Patient HL levels were related to the information exchange process during the visit. Among the three HL scales, communicative HL (the capacity to extract information, derive meaning from different forms of communication and apply new information to changing circumstances) was related to patient’s perceptions of the information exchange. Further, patient communicative HL had a modifying effect on the relationship between physician’s information giving and patient’s perception of it, suggesting that physician’s communication may be perceived differently depending on the patient’s HL.

**Conclusion.** The exploration of patient HL may provide a better understanding of potential barriers to patient–physician communication and patient’s self-management of disease.

**Keywords.** Information giving, health literacy, patient–physician communication, patient participation, patient satisfaction.

**Introduction**

In recent decades, patient participation in the health care process has been recognized as a key to successful disease management. This is especially true in the case of lifestyle-related diseases such as diabetes, which require extensive and ongoing patient self-care. Studies of diabetes patients have reported that patient’s active involvement in visit communication is related to decreased functional limitations and improvement in metabolic control.1–4

One of the major functions of the communication during a medical visit is the exchange of information between the patient and physician.3 Information exchange is an important process for patients and physicians to discuss problems and future treatment plans.

Received 12 September 2008; Revised 22 May 2009; Accepted 10 September 2009.

*Department of Culture and Medicine, Shiga University of Medical Science, Seta Tsukinowa-cho, Otsu, Shiga 520-2192, Japan, Department of Hygiene and Public Health, Department of Internal Medicine, Teikyo University School of Medicine, Itabashi, Tokyo 173-8605, Japan and Department of Health Sociology, Graduate School of Health Sciences and Nursing, The University of Tokyo, Bunkyo, Tokyo 113-0033, Japan. Correspondence to Hirono Ishikawa, Department of Culture and Medicine, Shiga University of Medical Science, Seta Tsukinowa-cho, Otsu, Shiga 520-2192, Japan; E-mail: hirono-tky@umin.ac.jp
However, it has been widely acknowledged that patients vary in their preference for participation and actual communication behaviours during a medical visit. Recently, the capacity of individuals to access, understand and use health information to make informed and appropriate health-related decisions has been conceptualized as health literacy (HL). Although it has been variously defined, HL is recognized as an important factor that may affect patient’s participation in the care process.

Adequate HL may help the patient to understand the problem, seek information from health care providers and other sources and make informed and shared decisions, which can lead to better treatment adherence and subsequent self-management. Limited functional HL is acknowledged to have negative effects on patient knowledge and understanding of one’s health, disease, medications and treatments and on the desire to participate in health care decision making. Further, patients with limited HL are more likely to use their physician as the sole source of medical information and are less likely to seek information from other sources. However, it has been suggested that patients with inadequate HL rate their physician’s communication lower in the domains of general clarity, explanation of condition and explanation of the care process and ask fewer questions about medical care issues.

Among the well-regarded definitions of HL, Nutbeam proposed a model of HL that includes three levels: functional literacy, the basic level of reading and writing skills that allow a person to function effectively in everyday situations; communicative literacy, advanced skills that allow a person to extract information, derive meaning from different forms of communication and apply new information to changing circumstances and critical literacy, more advanced skills to critically analyse information and use information to exert greater control over life events and situations. Although previous research on HL has focused predominantly on functional HL, an assessment of HL beyond the functional level may be more important in exploring barriers for patients in communicating with their physician.

We explored the relation of three levels of HL to patient–physician information exchange during visits for patients with type 2 diabetes.

Methods

Study population and setting

The participants were patients with type 2 diabetes who visited the outpatient department of internal medicine at a university-affiliated hospital in Tokyo, Japan. The inclusion criteria were having type 2 diabetes and being under continuous care by the four attending physicians in the department who specialize in metabolic diseases. During the study period from October to December 2006, we aimed to recruit about 150 patients in this study and randomly selected eligible patients from the appointment logs of the study physicians. The selected patients were approached in the waiting room after a consultation and were given an explanation of the study purpose and procedures. The age, gender, most current HbA1c level and complications of each participant were obtained from a review of electronic medical records.

Of the 169 eligible patients identified, 157 patients provided written consent to participate in the study and completed the first questionnaire. Of the 12 refusals (refusal rate: 7.1%), the major reasons for refusal were lack of time and poor physical condition on the day of the questionnaire. On their next visit to the physician, typically 4 weeks later, we recorded the consultation for the analysis of communication and asked the patient to complete the second questionnaire after having a consultation. We excluded nine patients who were accompanied by another person during the visit because the dynamics of interactions in triads may differ from those in dyad cases. Another 14 patients did not return the second questionnaire. The final sample size was 134 patients. The study was conducted with the approval of the Ethical Review Committee at Teikyo University School of Medicine.

Measures

Health literacy. Patient HL was measured using newly developed self-rated scales of functional, communicative and critical HL. The details of scale development and validation are described elsewhere.

Functional HL was assessed by five items that examined the extent to which patients experienced difficulties in reading the instructions or leaflets from hospitals and pharmacies (Cronbach’s α = 0.84). Communicative HL was evaluated by five items that assessed the extent to which patients had extracted and communicated diabetes-related information since they were diagnosed with the disease (α = 0.77). Critical HL was assessed by four items that focused on the extent to which patients had critically analysed diabetes-related information and used it to make decisions (α = 0.65). Each item was rated on a four-point scale, ranging from 1 = never to 4 = often. The scores for the items in each scale were summed and divided by the number of items in the scale to give a scale score (theoretical range, 1–4). The scores were reversed for functional HL, so that higher scores indicated higher HL.

Information exchange process. The Roter Interaction Analysis System (RIAS) was used to analyse the recorded communication between patient and physician.
The RIAS manual has been translated into Japanese and demonstrated to be a valid and reliable instrument for the analysis of Japanese medical communications. The reliability of the coding was assessed over randomly selected 20 consultations, which were independently coded by two coders. The intra-class correlation coefficient (R) was calculated as a measure of actual agreement between coders. The average R was 0.85 for clusters of patient communication (range, 0.72–0.97) and 0.82 for physician communication (range, 0.56–0.91). Thus, the inter-coder reliability was adequately high.

Indicators of major information exchange communication were created by condensing the original RIAS categories based on category groupings that have been used in previous studies (i.e. frequencies of question asking and medical/psychosocial information giving for the patient and frequencies of open/closed-ended question asking, information giving and counselling and direction for the physician). Of these variables, the total amount of patient’s question asking and information giving was used as an indicator of patient’s participation in examining the relationship with patient’s perceived participation. The amount of physician’s information giving was used as an indicator of physician’s explanation in examining the relationship with patient’s perception of physician’s explanation.

Patient’s perception of the information exchange. Patient’s perceived participation was measured by five items adopted from the patient’s perceived participation measure, asking whether the patient (i) talked about physical conditions and symptoms, (ii) talked about worries and concerns, (iii) expressed preferences for the treatments and tests, (iv) asked what they wanted to ask and (v) asked for a detailed explanation of their condition and test results.

Patient’s perception of physician’s explanation was measured by five items adopted from the domain of explanation in Interpersonal Processes of Care in Diverse Populations Questionnaire, asking whether their physician provided sufficient information about (i) their conditions and test results, (ii) medications, (iii) lifestyle regimen, (iv) treatment regimen and (v) checked for the patient’s understanding.

For both measures, we selected the items from the original measures and slightly revised the wording of some items to make them more relevant to the participants in this study, based on a pilot survey with a small number of patients before starting this study.

Both measures were assessed for each patient through the second questionnaire. Each item was rated on a four-point scale, ranging from 1 = not at all to 4 = very much. The scores for the items in a scale were summed to give a scale score (theoretical range, 5–20), with higher scores indicating greater participation and satisfaction. The Cronbach’s α of the scales were 0.83 and 0.84, respectively.

Sociodemographic and clinical characteristics. The educational attainment and duration of diabetes were determined for each patient from the self-reported questionnaire. The age, gender, HbA1c level and presence of major diabetes complications (i.e. retinopathy, nephropathy and neuropathy) were obtained from the review of electronic medical records. Visit length was recorded from the audio file.

Statistical analysis

The relationships of patient HL with information exchange process variables were examined, controlling for patient and clinical characteristics (i.e. age, gender, educational attainment, duration of diabetes, HbA1c level and visit length). Information exchange process variables were dichotomized at the median because of the skewness. Because patients were recruited from four physicians, the logistic regression analysis with robust variance estimates was used to compensate for within-group correlations among patients seeing the same physician. Similarly, the relationships of patient HL and actual information exchange process with patient’s perception of the information exchange were examined using the linear regression analysis with robust variance estimates. Further, the interaction terms between patient HL and information exchange process variables were added to see how the association between patient’s perception of the information exchange and actual information exchange process was affected by the moderating effect of patient HL. The analyses were conducted using Stata 10.0 software (Stata Corporation, College Station, TX).

Results

Patient and clinical characteristics

The sociodemographic and clinical characteristics of the participants are shown in Table 1. The mean age of the patients was 65 years, and the mean time since the diagnosis of diabetes was 11.5 years. Based on the most recent test results for HbA1c, 31.6% of the patients were in tight control (<6.5%), 42.8% were in fair control (6.6–7.9%) and 25.6% were in poor control (≥8.0%). The patients had seen the physician at the outpatient service for an average of 6.8 years (SD = 5.8; not shown in Table 1).

The mean scores of HL were higher for functional HL and lower for critical HL. The average length of the visit was 5 minutes. The descriptive results of the information exchange process (i.e. the frequency of each of the patient’s and physician’s information exchange behaviour based on the RIAS) and patient’s perception of information exchange are summarized...
As has been reported in previous studies using the RIAS, information giving by patient and physician accounted for a good proportion of the visit communication (29.8% and 30.8% of their talk, respectively).

**Patient HL and information exchange process during the visit**

Table 2 shows the relationship of patient functional, communicative and critical HL with the RIAS indicators of patient communication, controlling for patient and clinical characteristics. Patients with higher communicative HL asked more questions during the visit, whereas patients with higher critical HL provided more psychosocial information.

Table 3 shows the relationship of patient HL with physician communication. Physicians used more closed-ended questions and provided more information for patients with higher functional HL. In contrast, in talking with patients with higher critical HL, physicians used less counselling and direction and tended to use fewer closed-ended questions.

**Patient HL and patient’s perception of the information exchange**

Patients with higher communicative HL tended to perceive that they had actively participated in the visit communication (Table 4). Also, the actual amount of patient’s questions and information giving was positively associated with the perceived participation. There was no interaction effect between patient HL and the amount of their questions or information giving.

Patients with higher communicative HL were more likely to perceive physician’s explanation as satisfactory. The actual amount of physician’s information giving was not significantly associated with patient’s perception; however, there was an interaction effect of physician’s information giving and patient communicative HL on patient’s perception of physician’s explanation (Model 2 in Table 4). Patient’s perception of physician’s explanation did not change much with the amount of physician’s information giving in patients with higher communicative HL, whereas there was a significant positive association in patients with lower communicative HL (Fig. 1).

**Discussion**

We explored the relationships among three levels of patient HL (i.e. functional, communicative and critical HL) and patient–physician information exchange during a visit.

Patient HL levels were related to both patient’s and physician’s communication behaviours during the visit. Patients with higher communicative HL were more likely to ask questions. Although patient question asking has been considered an indicator of their active participation in the care process, it is widely acknowledged that many patients find it difficult to ask questions of their physician. This may be particularly true for Japanese patients because of cultural norms and relatively short visit lengths. Patients with higher communicative HL may have the motivation and skills to seek information from their physician within a limited visit time. Unlike a previous report that low-literacy patients asked fewer questions about medical care issues during the visit, we did not find a significant relationship between patient functional HL and question asking. This may be partly because our sample was less likely to have problems with functional literacy. Rather, communicative HL, defined as the capacity to extract information, derive meaning from different forms of communication and apply new information to changing circumstances, might be more important in interpersonal communication with the physician, even in patients with adequate functional HL.
Similarly, patients with higher critical HL were more likely to provide psychosocial information during the visit. There is a theoretical supposition that critical HL involves more advance skills for critically analysing information and using information to exert greater control over life events and situations. Patients with higher critical HL may provide psychosocial information to check the credibility of the information.

### TABLE 2  Relationship of patient HL to patient communication behaviours

<table>
<thead>
<tr>
<th>Question asking</th>
<th>Information giving: medical</th>
<th>Information giving: psychosocial</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Age</td>
<td>1.01</td>
<td>0.95–1.07</td>
</tr>
<tr>
<td>Gender (1: female)</td>
<td>1.13</td>
<td>0.74–1.71</td>
</tr>
<tr>
<td>Education</td>
<td>0.90</td>
<td>0.68–1.18</td>
</tr>
<tr>
<td>Duration of diabetes</td>
<td>0.96</td>
<td>0.92–1.02</td>
</tr>
<tr>
<td>HbA1c (1: &gt;6.5%)</td>
<td>1.93</td>
<td>0.38–9.90</td>
</tr>
<tr>
<td>Visit length</td>
<td>1.95</td>
<td>3.18–2.21</td>
</tr>
<tr>
<td>Functional HL</td>
<td>0.96</td>
<td>0.75–1.24</td>
</tr>
<tr>
<td>Communicative HL</td>
<td>2.52</td>
<td>1.76–2.88</td>
</tr>
<tr>
<td>Critical HL</td>
<td>1.24</td>
<td>0.71–2.17</td>
</tr>
</tbody>
</table>

OR, odds ratio; CI, confidence interval.

### TABLE 3  Relationship of patient HL to physician communication behaviours

<table>
<thead>
<tr>
<th>Open-ended question</th>
<th>Closed-ended question</th>
<th>Information giving</th>
<th>Counseling/direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td>95% CI</td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Age</td>
<td>0.99</td>
<td>0.95–1.03</td>
<td>0.96</td>
</tr>
<tr>
<td>Gender (1: female)</td>
<td>1.19</td>
<td>0.51–2.82</td>
<td>0.82</td>
</tr>
<tr>
<td>Education</td>
<td>0.85</td>
<td>0.62–1.16</td>
<td>0.78</td>
</tr>
<tr>
<td>Duration of diabetes</td>
<td>1.02</td>
<td>1.00–1.05</td>
<td>0.96</td>
</tr>
<tr>
<td>HbA1c (1: &gt;6.5%)</td>
<td>0.68</td>
<td>0.29–1.61</td>
<td>2.03</td>
</tr>
<tr>
<td>Visit length</td>
<td>1.25</td>
<td>1.07–1.46</td>
<td>1.54</td>
</tr>
<tr>
<td>Functional HL</td>
<td>1.35</td>
<td>0.59–3.09</td>
<td>1.17</td>
</tr>
<tr>
<td>Communicative HL</td>
<td>0.83</td>
<td>0.42–1.65</td>
<td>1.28</td>
</tr>
<tr>
<td>Critical HL</td>
<td>1.02</td>
<td>0.42–2.46</td>
<td>0.43</td>
</tr>
</tbody>
</table>

OR, odds ratio; CI, confidence interval.

### TABLE 4  Relationship of patient HL to patient’s perception of information exchange

<table>
<thead>
<tr>
<th>Perceived participation</th>
<th>Perception of physician’s explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
</tr>
<tr>
<td></td>
<td>Beta</td>
</tr>
<tr>
<td>Age</td>
<td>–0.01</td>
</tr>
<tr>
<td>Gender (1: female)</td>
<td>0.95</td>
</tr>
<tr>
<td>Education</td>
<td>0.56</td>
</tr>
<tr>
<td>Duration of diabetes</td>
<td>0.01</td>
</tr>
<tr>
<td>HbA1c (1: &gt;6.5%)</td>
<td>–0.07</td>
</tr>
<tr>
<td>Visit length</td>
<td>0.02</td>
</tr>
<tr>
<td>Functional HL</td>
<td>–0.04</td>
</tr>
<tr>
<td>Communicative HL</td>
<td>1.63</td>
</tr>
<tr>
<td>Critical HL</td>
<td>–0.42</td>
</tr>
<tr>
<td>Patient’s question and information</td>
<td>0.07</td>
</tr>
<tr>
<td>Physician’s information giving</td>
<td></td>
</tr>
<tr>
<td>Communicative HL × information</td>
<td></td>
</tr>
</tbody>
</table>

In Model 1, the main effects of patient’s HL and actual information exchange process were examined, and an interaction term between patient’s HL and actual information exchange process was added in Model 2. SE, standard error.
they had obtained from other sources with their physician and to consider its applicability to their situations.

Physicians asked more closed-ended questions and provided more information for patients with higher functional HL. It has been reported that patients with lower functional HL have greater difficulty understanding physician’s explanation and are more likely to ask a physician to repeat something. It is plausible that patients with higher functional HL were able to respond to the physician more quickly, and thus, physicians were able to ask more questions and provide more information in a limited consultation time. In fact, the relationship of patient functional HL with physician’s closed-ended questions and information giving disappeared when the visit length was not controlled (data not shown). Although we did not find a statistically significant association between patient functional HL and visit length, the direction of the association was negative (i.e. the visit length tended to be shorter for patients with higher HL). Thus, physicians might take more time for patients with lower functional HL to elicit and/or provide necessary information.

In contrast, physicians tended to use fewer closed-ended questions and directive statements in talking with patients with higher critical HL. Closed-ended questions and directions have often been considered as physician-centred behaviours to control the visit communication. Physicians may be less likely to use such control of communication because patients with higher critical HL prefer to take the initiative in visit communication and actively engage in the care process. Indeed, the other part of our study suggested that patient critical HL was positively associated with self-efficacy in diabetes self-care.

Of the three HL scales, communicative HL was related to patient’s perception of participation and perception of physician’s explanations. Further, patient communicative HL had a modifying effect on the relationship between physician’s information giving and the patient’s perception of it, suggesting that physician’s communication may be perceived differently depending on the patient’s HL. Patients with lower communicative HL perceived physician’s explanation as more satisfactory as the amount of information provided by the physician increased, which was not as clearly observed in patients with higher communicative HL. It has been suggested that patients with limited HL are more likely to use their physician as the sole source of medical information and are less likely to seek information from other sources. Additionally, we found that patients with lower communicative HL asked fewer questions to seek information from their physician. It may be particularly important for physicians to provide sufficient information for these patients, even if they do not actively seek information by asking questions. In contrast, patients with higher communicative HL may be more aware of the information they need and thus evaluate physician’s information giving based on whether it meets with their specific needs rather than by the total amount of information.

Several limitations should be noted in interpreting our findings. First, the study was conducted at a single university hospital in a metropolitan area using a sample of patients who had established relationships with their physicians. It is possible that the patients were better educated and less likely to be illiterate than those who attend local clinics or live in rural areas. Additionally, our findings may be specific to the Japanese context. Although the sociocultural context and practice style may differ between Japanese and Western settings, a previous study has suggested that the associations of HL with patient and clinical characteristics are generally similar to those reported in previous western studies.

A second possible limitation of our study is that HL was measured based on a self-reported questionnaire. Individuals with reading problems are often ashamed and hide their inability to read, which may have led to an overestimation of HL. Further, because standard measures of functional HL such as Short Test of Functional Health Literacy in Adults or Rapid Estimate of Adult Literacy in Medicine are not available in Japanese, we were unable to examine the relationship between our HL scale and these measures. This issue should be explored in a future study with an English-speaking population.

Despite these limitations, our results suggest that patient HL is related to both patient’s and physician’s
communication behaviours during the visit, as well as the patient’s perception of the process. It would be important for physicians to be aware of the differences among patients and to adopt flexible strategies of information exchange that can accommodate their patients’ ability and needs. The examination of patient HL levels may provide a better understanding of the potential barriers to patient–physician communication during the visit and patient’s self-management of disease.

Acknowledgements

We express sincere thanks to all patients who participated in this study at the Teikyo University Hospital.

Declaration

Funding: Grant-in-Aid for Young Scientists (B) from the Japanese Ministry of Education, Culture, Sports, Science, and Technology (18700546).

Ethical approval: Teikyo University School of Medicine.

Conflicts of interest: none.

References