

Health literacy education for children: acceptability of a school-based program in oral health

Mariko Naito¹⁾, Takeo Nakayama²⁾ and Nobuyuki Hamajima¹⁾

¹⁾Department of Preventive Medicine/Biostatistics and Medical Decision Making,
Nagoya University Graduate School of Medicine, Nagoya, Japan

²⁾Department of Health Informatics, Kyoto University School of Public Health, Kyoto, Japan

(Received 24 July and accepted 27 December 2006)

Abstract: A study was conducted to examine the acceptability and effectiveness of a new type of health literacy program for children. The program was organized in the form of a workshop by a dentist. Sixty-three students aged 11-12 years were divided into 14 groups. The discussion topic was the effectiveness of toothbrushing for preventing periodontal disease. To investigate this issue, each group was asked to choose the most appropriate study design for obtaining a reliable answer. After the group discussion, the participants received a lecture on appraising the quality of health information. Pre- and post-program questionnaire surveys were administered to assess the program. Sixteen percent of the students had searched for health information via the Internet; however, 56% claimed to be interested in searching for health information via the Internet. The most approved design was a cohort study (seven groups) as the most valid type of research for showing the effectiveness of toothbrushing. The post-program questionnaire survey revealed that 89% of participants easily understood the content of the program, and 76% found the program to be useful. These findings demonstrate the feasibility of using health literacy programs for schoolchildren. Health literacy programs for children will need to be developed and administered through collaboration between education and health professionals. (*J. Oral Sci.* 49, 53-59, 2007)

Keywords: health literacy program; oral health; children; health information.

Introduction

Health campaigns have started to recognize the importance of environmental influences on health behavior and attitudes, and have incorporated this aspect of behavior into chronic disease risk-reduction programs (1). Health literacy has been defined as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (2).

The kindergarten through twelfth grade educational system in the United States offers a platform for interventions to improve health literacy (3). While gaining the ability to interpret messages critically, students can also acquire life skills and knowledge that form the basis for responsible decision-making (4).

Commentators have rightly concerned themselves with the 'digital divide' caused by issues of physical access to the Internet, which are exacerbating unacceptable health inequalities (5). The use of the Internet to find health information constitutes an excellent example of a situation in which demands are made upon an individual's health literacy with respect to finding, evaluating, and applying information to achieve a positive health outcome (6). Eysenbach and Jadad proposed that consumers should be able to access and evaluate information that is relevant to their health needs (7). An association between weak health literacy and poor health outcomes has been reported in several studies (8-11).

On the other hand, evidence-based medicine (EBM), which was originally proposed by Guyatt, has been extended to 'evidence-based practice' (EBP) (12). EBP is

Correspondence to Dr. Mariko Naito, Department of Preventive Medicine/Biostatistics and Medical Decision Making, Nagoya University Graduate School of Medicine, 65 Tsurumai-cho, Showa-ku, Nagoya 466-8550, Japan
Tel: +81-52-744-2132
Fax: +81-52-744-2971
E-mail: mnaito@med.nagoya-u.ac.jp

an approach to health care in which health professionals use the best evidence possible, i.e., the most appropriate information available, to make clinical decisions for individual patients (13). Therefore, the ability to evaluate relevant information critically, one component of health literacy, is essential to EBP.

Nutbeam categorizes health literacy into three types. Type I indicates functional health literacy and reflects the outcome of traditional health education based on the communication of factual information on health risks and on the use of the health system (14). Type II is interactive health literacy, which is focused on the development of personal skills in a supportive environment. Type III is critical health literacy, which reflects the outcomes of cognitive and skills developments that are oriented toward supporting effective social and political actions rather than individual action.

Although the importance of health literacy education is being recognized, few studies concerning programs administered to children or adolescents have been reported (15). In the present study, we developed a new type of health literacy program for children. The literacy rate in Japan is almost 100%, and basic skills of reading and writing are not major topics in the area of health literacy. Therefore, knowledge of EBM, particularly the appraisal of information quality in terms of types of human research, was taken into account in developing the present program. No health literacy programs that focus on a knowledge of EBM have been introduced for either children or adults.

According to Nutbeam's proposal, this program is targeted to Type II health literacy. Furthermore, there are no reported school-based health programs for children using scenarios and small group discussion.

The goals of this study were to increase awareness of health information and its quality in schoolchildren's surroundings, and to examine the effectiveness and acceptability of the health literacy program.

Materials and Methods

The program was conducted in the form of a workshop in a classroom during November 2003. Sixty-three students at grade 6 (11-12 years old) in a public elementary school in an urban area of Fukuoka Prefecture, Japan, participated in the program. This school had been conducting oral health education for students using schoolteachers and dental professionals between 1999 and 2004, and prevention of periodontal disease had been one of the targeted issues. Every year, schoolchildren underwent an oral health check in addition to a clinical examination for periodontal disease, and a dental professional or schoolteacher gave the students an annual lecture on oral health.

In total, 49% of the participants were female (Table 1). The program consisted of a 2-hour program, facilitated by a dentist, as part of the standard curriculum. The participants were asked to complete pre- and post-program questionnaires. In the pre-program questionnaire survey, questions regarding the use of the Internet, interest in searching for health information via the Internet, and

Table 1 Demographics of the participants

	No.	%
Sex		
Male	32	51
Female	31	49
How many times have you searched for information on the Internet by yourself?		
More than 4 times	40	64
1 - 3 times	21	33
Never	2	3
What is your impression of the Internet?		
Difficult	16	25
Interesting	49	78
Convenient	56	89
Irrelevant to me	2	3
Want to use it	10	16
Are you conscious of your own health?		
Yes	56	89
Not particularly	7	11

awareness of health issues were asked (Fig. 1). The content of the workshop was developed based on the results.

In the workshop, the participants were divided into 14 small groups, each comprising four or five students. Discussion sheets with scenarios were provided for the children as the workshop materials. The discussion topic was whether toothbrushing is effective for preventing periodontal disease. To investigate this issue, three study designs were suggested: a cross-sectional study, a cohort study, and a randomized controlled study (RCT). General levels of internal validity are known for these study types. RCT, which is free of bias relative to the other types of study, provides the most valid information. The second most valid study design is the cohort study, and third most valid is the cross-sectional study. Based on this background, hypothetical study scenarios were developed in the following manner.

In the cross-sectional study design, the schoolchildren completed both a clinical examination and self-administered questionnaire regarding oral health behavior, such as toothbrushing. The association between the average frequency of toothbrushing and the prevalence of periodontal disease was analyzed. For the cohort study design, schoolchildren underwent a clinical examination and completed a self-administered questionnaire at the baseline. The children were followed for 1 month, and the incidence of periodontal disease and frequency of daily toothbrushing were assessed. The association between the average frequency of toothbrushing and the incidence

of periodontal disease was then analyzed. For the RCT, schoolchildren were randomly allocated to two groups. The subjects in the control group did not brush their teeth for a week, and those in the intervention group brushed their teeth three times a day. One week later, the incidence of periodontal disease was determined and compared between the two groups.

The facilitator explained the scenario and three choices using PowerPoint slides in a computer presentation. Each group was asked to choose the most appropriate study design for obtaining a reliable answer. After group discussions, each group presented their selection and defended their reasoning. A discussion including all the groups was then conducted. The groups then received a lecture that focused on the quality of health information and the necessity of paying attention to the evidence on which health information was based. Finally, a computer lesson on searching for health information via the Internet was provided, and the students practiced researching health information using search engines. After the workshop, a post-program questionnaire survey was conducted to assess the program (Fig. 2).

Data were analyzed using SPSS version 11.0 for Windows (SPSS, Chicago, IL, USA). For the responses to the pre-program questionnaire, chi-squared test was used.

Results

All 63 students completed both the pre- and post-program questionnaire surveys. All the participants had had prior experience of using personal computers through the standard curriculum computer classes at school. According to the pre-program questionnaire survey, 97% had searched for information on the Internet by themselves. Although 78% of the participants stated that the Internet is interesting,

<p>1. How many times have you searched for information on the Internet by yourself, except as part of the school curriculum? 1) More than 4 times 2) 1-3 times 3) Never</p> <p>2. What is your impression of the Internet? [choose any] 1) Difficult 2) Interesting 3) Convenient 4) Irrelevant to me 5) Want to use it 6) No impression 7) Other (<i>please specify</i>) ()</p> <p>3. Have you searched for health information on the Internet by yourself? 1) Yes 2) No</p> <p>4. Are you interested in searching for health information on the Internet by yourself? 1) Yes 2) Not particularly</p> <p>5. Are you conscious of your own health? 1) Yes 2) Not particularly</p> <p>If YES, please describe what you consciously do in daily life to maintain your health.</p>
--

Fig. 1 The pre-questionnaire completed before the workshop.

<p>1. The workshop content was easy to understand. 1) Agree 2) Cannot say 3) Disagree 4) Do not know</p> <p>2. The workshop content was interesting. 1) Agree 2) Cannot say 3) Disagree 4) Do not know</p> <p>3. I found the workshop content useful. 1) Agree 2) Cannot say 3) Disagree 4) Do not know</p> <p>4. I want to learn more about evaluating health information. 1) Agree 2) Cannot say 3) Disagree 4) Do not know</p> <p>5. Please add any comments about the workshop.</p>

Fig. 2 The post-questionnaire completed after the workshop.

only 25% labeled it as difficult. Only a few participants (3%) stated that the Internet is not relevant to them. A total of 16% had prior experience in searching for health information via the Internet, but 56% claimed to be interested in doing so, despite their lack of experience. Eighty-nine percent of the participants were conscious of health behavior such as exercise, oral hygiene, and sleeping. Students who were health conscious were more interested in searching for health information via the Internet than those who were not health conscious ($P < 0.01$) (Table 2).

During the workshop, all participants were told of the beneficial effects of toothbrushing for maintaining oral health, and a total of 87% agreed that toothbrushing affected the maintenance and promotion of oral health. Of

the 14 groups, seven selected a cohort study as the most valid type of research to demonstrate the effectiveness of toothbrushing; this was followed by a cross-sectional study, selected by six groups. RCT was selected by only one group (Table 3). The reasons why the study types were not chosen were the reliability of self-reported behavior for the cross-sectional study, the long study period for the cohort study, and unfairness between the two groups for the RCT which the only one group could obtain benefit from an intervention.

In the post-program questionnaire survey, 89% of participants responded that the content of the workshop was easy to understand (Table 4). More than 70% were interested in the content and thought that it would be

Table 2 The association between health information searches via the Internet and the health consciousness of participants in the pre-program questionnaire survey

	Health conscious (n = 56)		Not health conscious (n = 7)		<i>P</i>
	No.	%	No.	%	
I have searched for health information via the Internet	9	16	1	14	n.s.
I am interested in searching for health information via the Internet	33	59	2	29	< 0.01

Table 3 The number of groups that chose each study design and the reasons why each design was or was not chosen

	Study design		
	Cross-sectional study	Cohort study	Randomized controlled trial
No. of groups	6 (43%)	7 (50%)	1 (7%)
The reasons why this design was chosen	Convenient, easy to conduct, short time to complete	Higher validity for the result	Higher validity for the result
The reasons why this design was not chosen	Lower reliability of the study's result, lower reliability of self-reported behavior	Requires a long time to complete, troublesome to check oral health behavior during the research period	Unfairness if allocated to the group that the participants dislike, unhealthy status in the control group

Table 4 Frequency distribution of the responses about the workshop in the post-program questionnaire survey

Question	Agree		Cannot say		Disagree		Do not know		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
The content of the WS was easy to understand.	56	89	5	8	2	3	0	0	63	100
The content of the WS was interesting.	44	70	13	21	6	9	0	0	63	100
The content of the WS will be useful for me.	48	76	5	8	2	3	8	13	63	100
I want to learn more about evaluating health information.	33	52	12	19	12	19	6	10	63	100

WS, Workshop

useful. Fifty-two percent expressed positive attitudes about learning how to evaluate health information.

Discussion

This report has described exploratory work with schoolchildren regarding a new type of health literacy program modeled after EBM workshops for health professionals. According to a survey conducted by the Japanese Ministry of Internal Affairs and Communications in 2003, a total of 62% and 92% of Japanese children aged 6-12 and 13-19 years, respectively, had used the Internet (16).

Most of the subjects were conscious of their health behavior and had a positive impression of the Internet, even though less than 20% had prior experience of searching for health information via the Internet. The study findings showed that only a small percentage of the children in this study understood the Web as a health information source; the findings of this study also point to the potential of this health literacy program for use with elementary schoolchildren.

The World Health Organization defines health literacy as the cognitive and social skills that determine the motivation and ability of individuals to access, understand, and use information in ways that promote and maintain good health (17). The 2004 U.S. Institute of Medicine report, *Health Literacy: A Prescription to End Confusion*, expanded our understanding of the scope of health literacy by addressing the issue of health-related actions that adults can take at home, at work, and in the community, as well as in a variety of health systems and care settings (18).

Interestingly, the participants were likely to identify the strengths and limitations of a study design correctly even though they had no knowledge of epidemiology. However, most of the groups did not choose the RCT. One of the most important reasons was that they tended to choose an answer from the standpoint of morality or feasibility of studies by imagining themselves as the study subjects under each scenario. Concerning the purpose of this program, the scientific reliability of the study findings should have been emphasized more as a discussion point to prompt answers when a scenario was provided at the beginning. At the end of the discussion, the facilitator mentioned the relationship between the reliability of the findings of epidemiological studies and ethical issues. Both providing scientific information and encouraging the participants' interest in human research are essential for increasing the effectiveness of this program, although further discussion is needed.

Peterson and colleagues noted that health information provided to children or adolescents should be scientifically

accurate and derived from legitimate and empirically valid sources (19). Sources for obtaining reliable health information should be taught to schoolchildren, but it is also useful to teach basic rules for evaluating information in order to assess its reliability and validity by critiquing the quality of the information and the evidence on which the information is based. Promoting the importance of understanding the research that is the foundation for health information will be the key to improving health literacy. Furthermore, inclusion of the basic principles of EBM or epidemiology into health literacy programs may be useful.

Nearly 90% of participants understood the content of this workshop without experiencing any difficulties. One of the reasons for this rate of comprehension was the selection of the discussion material. The topics regarding oral health were familiar to schoolchildren and easy to understand. Researchers have recommended that primary prevention programs, such as those dealing with eating disorders, be introduced to children in upper elementary school (20). Health literacy education at an early age, before children are exposed to too much information from their surroundings, could be essential. Similar to the EBM workshops that are widely held for health professionals, the education style of a small group discussion with a case scenario will be useful for children and adolescents. More than 70% of the participants were interested in the topic and indicated the usefulness of the program. These findings suggest that this program stimulated the children's interest and awareness regarding the quality of health information. As the next step, the value of the program through both short- and long-term effects needs to be evaluated.

The Internet functions as an additional resource of health information for people who are already in possession of knowledge and information skills, but the Internet is less valuable for people who are deficient in health literacy (21). Gray demonstrated that adolescents are sophisticated Internet users; nevertheless, adolescents still have gaps in their ability to find, evaluate, and apply online health information (22). Skinner reported that adolescents turn to Internet-based health resources because of their 24-hour-per-day availability (23). It was also suggested that health professionals could help by recommending Web sites for specific health issues, giving advice about topic search strategies, and providing guidance on the critical appraisal of information that is found. These recommendations indicate important new roles for health professionals.

St Leger noted that health literacy shows us that educators can collaborate with health professionals to achieve both public health outcomes and high levels of skill and knowledge in students (24). The focus on improving health literacy can help to reframe thinking about the content and

method of health education for schoolchildren. Systematic health literacy programs for children and adolescents will need to be developed and administered through collaboration between education and health professionals. Oral health promotion has been one of the key components of health programs in kindergarten and elementary school. Dental professionals may play an important role in health literacy education for children.

Acknowledgments

This work was supported in part by a Grant-in-Aid from the Ministry of Education, Culture, Sports, Science and Technology of Japan. The authors thank Ms. Hiroko Mori at Kyoto University and Ms. Chikako Takada for their valuable advice on conducting the workshop.

References

1. Wadsworth LA, Thompson AM (2005) Media literacy: a critical role for dietetic practice. *Can J Diet Prac Res* 66, 30-36
2. U.S. Department of Health and Human Services (2000) Health literacy. In *Current bibliographies in medicine*, Patrias K ed, National Library of Medicine, available online at www.nlm.nih.gov/pubs/cbm/hliteracy.pdf
3. Parker R, Kreps GL (2005) Library outreach: overcoming health literacy challenges. *J Med Libr Assoc* 93, S81-85
4. McBrien JL (1999) New texts, new tools: an argument for media literacy. *Educ Leadership* 57, 76-79
5. Brodie M, Flournoy RE, Altman DE, Blendon RJ, Benson JM, Rosenbaum MD (2000) Health information, the internet, and the digital divide. *Health Aff (Millwood)* 19, 255-265
6. Gray NJ, Klein JD, Noyce PR, Sesselberg TS, Cantrill JA (2005) Health information-seeking behaviour in adolescence: the place of the internet. *Soc Sci Med* 60, 1467-1478
7. Eysenbach G, Jadad AR (2001) Consumer health informatics in the internet age. In *Evidence-based patient choice*. Edwards A, Elwyn G eds, Oxford University Press, Oxford, 289-307
8. Schillinger D, Grumbach K, Piette J, Wang F, Osmond D, Daher C, Palacios J, Sullivan GD, Bindman AB (2002) Association of health literacy with diabetes outcomes. *JAMA* 288, 475-482
9. Baker DW, Parker RM, Williams MV, Clark WS (1998) Health literacy and the risk of hospital admission. *J Gen Intern Med* 13, 791-798
10. Williams MV, Baker DW, Parker RM, Nurss JR (1998) Relationship of functional health literacy to patients' knowledge of their chronic disease. A study of patients with hypertension and diabetes. *Arch Intern Med* 158, 166-172
11. Kalichman SC, Benotsch E, Suarez T, Catz S, Miller J, Rompa D (2000) Health literacy and health-related knowledge among persons living with HIV/AIDS. *Am J Prev Med* 18, 325-331
12. Guyatt GH (1991) Evidence-based medicine. *ACP J Club* 114, A-16
13. McKibbon KA (1998) Evidence based practice. *Bull Med Libr Assoc* 86, 396-401
14. Nutbeam D (2000) Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. *Health Promot Int* 15, 259-267
15. Neumark-Sztainer D, Sherwood NE, Collier T, Hannan PJ (2000) Primary prevention of disordered eating among preadolescent girls: feasibility and short-term effect of a community-based intervention. *J Am Diet Assoc* 100, 1466-1473
16. Information and Communications Policy Bureau, Japan (2004) Communications usage trend survey in 2003 compiled. The Ministry of Internal Affairs and Communications, available online at www.soumu.go.jp/s-news/2004/pdf/040414_1_a.pdf (in Japanese)
17. Nutbeam D (1998) Health promotion glossary. *Health Promot Int* 13, 349-364
18. Nielsen-Bohlman L, Panzer AM, Kindig DA (2004) Health literacy: a prescription to end confusion. National Academies Press, Washington DC, 3-328
19. Peterson FL, Cooper RJ, Laird JM (2001) Enhancing teacher health literacy in school health promotion: a vision for the new millennium. *J Sch Health* 71, 138-144
20. Kater KJ, Rohwer J, Londre K (2002) Evaluation of an upper elementary school program to prevent body image, eating, and weight concerns. *J Sch Health* 72, 199-204
21. Korp P (2006) Health on the Internet: implications for health promotion. *Health Educ Res* 21, 78-86
22. Gray NJ, Klein JD, Noyce PR, Sesselberg TS, Cantrill JA (2005) The internet: a window on adolescent health literacy. *J Adolesc Health* 37, 243
23. Skinner H, Biscope S, Poland B, Goldberg E (2003) How adolescents use technology for health information: implications for health professionals from focus group studies. *J Med Internet Res* 18, e32
24. St Leger L (2001) Schools, health literacy and public

health: possibilities and challenges. Health Promot
Int 16, 197-205