

RESEARCH ARTICLE

Readability, Suitability and Health Content Assessment of Cancer Screening Announcements in Municipal Newspapers in Japan

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Abstract

Background: The objective of this study was to assess the readability, suitability, and health content of cancer screening information in municipal newspapers in Japan. **Materials and Methods:** Suitability Assessment of Materials (SAM) and the framework of Health Belief Model (HBM) were used for assessment of municipal newspapers that were published in central Tokyo (23 wards) from January to December 2013. **Results:** The mean domain SAM scores of content, literacy demand, and layout/typography were considered superior. The SAM scores of interaction with readers, an indication of the models of desirable actions, and elaboration to enhance readers' self-efficacy were low. According to the HBM coding, messages of medical/clinical severity, of social severity, of social benefits, and of barriers of fear were scarce. **Conclusions:** The articles were generally well written and suitable. However, learning stimulation/motivation was scarce and the HBM constructs were not fully addressed. **Practice implications:** Articles can be improved to motivate readers to obtain cancer screening by increasing interaction with readers, introducing models of desirable actions and devices to raise readers' self-efficacy, and providing statements of perceived barriers of fear for pain and time constraints, perceived severity, and social benefits and losses.

Keywords: Patient education material - cancer screening - readability assessment in material - Tokyo newspapers

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Introduction

Cancer is the leading cause of death in Japan. A total of 805,236 new cases of cancer and 364,872 deaths from cancer were estimated in 2010 and 2013 (National Cancer Center, 2014). However, cancer screening rates in Japan are lower than those in Western countries. The screening rates for breast cancer in women aged 50-69 years and cervical cancer in women aged 20-69 years in 2010 were 80.4% and 85.0% in the United States, 77.0% and 78.6% in the United Kingdom, and 63.6% and 63.8% in Korea, but they were 36.4% and 37.7% in Japan, respectively (OECD, 2014). Other cancer screening rates in Japan are similarly low as follows: gastric cancer is 32.3%, lung cancer is 24.7%, and colorectal cancer is 26.0% (National Cancer Center, 2014). The Basic Plan to Promote Cancer Control Programs was launched in 2012. This plan aimed to increase cancer screening rates to 50% or higher (Ministry of Health, Labour and Welfare, 2007).

There are multiple barriers to cancer screening, such as knowledge, attitudes, and beliefs of patients and providers (Womeodu and Bailey, 1996). In recent years, low health literacy (HL) has been recognized as one of these barriers. HL is the ability to understand health information and to use that information to make good decisions about one's health and healthcare (Nielsen-Bohlman et al., 2004).

Low HL is associated with the inability to use health-related information and with low cancer screening rates (Oldah and Katz, 2014). Although many previous studies have approached HL as an individual's skills, HL is also determined based on interactions between an individual's skills and the demands of society in which the individual lives, including the manner in which health information is communicated in society (Institute of Medicine, 2009). Therefore, health information needs to be communicated in a manner easy to understand for those with low HL.

However, understandability is merely one of the factors to overcome for barriers of effective communication of cancer screening information. Doak et al. (1996a) argued that cancer-related materials should use strategies to enhance understandability, usability, relevancy, and motivation in patients. They developed the suitability assessment of materials (SAM) instrument to score education materials for patients on different factors, including readability and suitability (Doak et al., 1996b). Readability refers to reading difficulty. Suitability refers to ease of understanding and acceptance, including learning stimulation and motivation. The SAM is one of the few comprehensible instruments and has been validated by 172 health care providers from several cultures, including Asians (Doak et al., 1996b). The SAM has been adapted for evaluating cancer-related materials (Weintraub et al.,

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2004; Helitzer et al., 2009; Akansel and Aydin, 2011; Tian et al., 2014).

However, some researchers have criticized the SAM for not addressing important concepts, such as behavioral theory elements, and they have suggested that these elements should be added for more comprehensible evaluation (Helitzer et al., 2009; Smith et al., 2014). In previous studies that assessed cervical and colorectal cancer materials, descriptions of the constructs of the Health Belief Model (HBM) were evaluated in addition to assessment using the SAM (Helitzer et al., 2009; Smith et al., 2014; Tian et al., 2014). The HBM is used in health communication contexts to examine why individuals undertake or cease health behavior (Janz and Becker, 1984). The HBM consists of four main constructs: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. These four constructs explain the motivation and outcomes of obtaining cancer screenings (Abbaszadeh et al., 2007; Boonpongmanee

and Jittanoon, 2007; Allahverdipour and Emami, 2008; Hilmi et al., 2010; Allahverdipour et al., 2011; Ersin and Bahar, 2011; Esin et al., 2011; Baysal and Polat, 2012; Javadzade et al., 2012; Ersin and Bahar, 2013; Demirtas and Acikgoz, 2013; Fouladi et al., 2013; Tsunematsu et al., 2013; Yilmaz et al., 2013; Avci et al., 2014; Shiryazdi et al., 2014; Taymoori et al., 2014).

In Japan, most of the municipalities publish newspapers for residents to propagate administrative services, including information on cancer screening (Ministry of Health, Labour and Welfare, 2013). In fact, municipal newspapers are most frequently referred by residents as a source of cancer screening information (Tokyo Metropolitan Government Bureau of Social Welfare and Public Health, 2013). Therefore, improving cancer screening announcements in municipal newspapers is of paramount importance for effective communication of cancer screening information in Japan. However, the quality of cancer screening information in municipal

Table 1. Evaluation Items of the Japanese Version of the Suitability Assessment of Materials (SAM) Instrument

1. Content	
(a)	Purpose: The purpose is explicitly stated in the title or introduction.
(b)	Content topics: The content of the material is application of knowledge/skills aimed at desirable behavior of the reader rather than non-behavior facts.
(c)	Scope: The scope is limited to essential information directly related to the purpose.
(d)	Information: The information that readers want to know is described.
(e)	Summary and review: A summary is included and re-emphasizes the key messages in different words and examples.
2. Literacy demand	
(a)	Reading grade level: The level of the third year in junior high school or lower is desirable.
(b)	Writing style: Conversational style and active voice are used.
(c)	Vocabulary: Common words are used and technical terms are explained.
(d)	Sentence construction: Context is provided before presenting new information.
(e)	Advance organizers: Topics are preceded by an advance organizer (a statement that tells what is coming next).
3A. Graphics	
(a)	Cover graphics: The cover graphics are friendly, attract attention, and clearly portray the purpose of the material.
(b)	Type of illustrations: Illustrations are simple and familiar to the viewers.
(c)	Relevance of illustrations: Illustrations present key messages visually so that the reader/viewer can grasp the key ideas from the illustrations alone. There are no distractions.
(d)	Explanations and directions in graphs and charts: Step-by-step directions, with an example, are provided that will provide comprehension.
(e)	Caption: Explanatory captions are provided with illustrations and graphics.
3B. Layout/typography	
(a)	Layout: The layout and sequence of information are consistent. Visual cuing devices are used. Adequate white space is used.
(b)	Typography: Common type of text, adequate size of type, and typographic cues that emphasize key points are used.
(c)	Subheadings or "chunking": Information is grouped under descriptive subheadings or "chunks" and no more than five items are presented without a subheading.
4. Learning stimulation/motivation	
(a)	Interaction included in text and/or graphic: Problems or questions are presented for reader responses.
(b)	Desired behavior patterns are modeled: Instruction models of specific behaviors or skills are presented.
(c)	Self-efficacy and motivation: Readers are able to understand the content and perform the required behaviors.
(d)	Consideration of readers' anxiety: Expressions that enhance anxiety are not presented.
(e)	Respect for readers: Contemptuous or discriminatory expressions regarding readers' lifestyle and disease are not presented.

Readability, Suitability, and Health Content Assessment of Cancer Screening Announcements in Municipal Newspapers in Japan newspapers has not been examined.

This study aimed to evaluate the readability, suitability, and health content of cancer screening information in municipal newspapers in Japan using the SAM and the framework of the HBM. We also discuss how cancer screening information in newspapers could be improved.

Materials and Methods

Articles including cancer screening announcements were collected from municipal newspapers that were published in central Tokyo (23 wards) from January to December 2013. Each of the 23 wards publishes newspapers for the residents two to four times a month. The volume of the newspapers is from four to 16 pages of A3-sized paper. The PDF data of the municipal newspapers were downloaded from the website of each ward in April 2014 to use in analyses. During the sampling period, 257 articles including cancer screening announcements were identified. Because some of the articles were posted multiple times, the number of unique articles was 129. These 129 unique articles were investigated.

Coding procedure

One of the authors coded each sentence in all of the 129 articles by using the Japanese version of the SAM (Noro, 2009) and coding guidelines of the HBM. We chose the longest article from each of the 23 wards (18% of the total sample). Another author who is an experienced nurse, then became trained in these coding methods, and independently coded the 23 articles to examine the inter-coder reliability.

Measures

The SAM: The Japanese version of the SAM has been

developed (see Table 1)(Noro, 2009). This Japanese version consists of 23 items that are grouped into five domains: content, literacy demand, graphics, layout/typography, and learning stimulation/motivation (Appendix 1). Each item is rated as one of the following: superior (2 points), adequate (1 point), or not suitable (0 points). Items deemed not applicable to a particular material are not scored (not applicable). The total SAM score (%) is calculated by the following formula: total points earned/total possible points. The domain SAM score (%) is also calculated by the same formula within each domain. Scores of 70-100 were considered “superior”, scores of 40-69 were deemed “adequate”, and scores <40 were considered “inadequate” (Doak et al., 1996b).

The readability (item 2 [a] in Table 1) was assessed using *kotoba hushigi bako*, which is a Japanese readability analyzer. *Kotoba hushigi bako* calculates a material’s reading level by matching words to grades in school, and shows a readability level as a grade in school (Sato et al., 2009). In the Japanese version of the SAM, a readability level below the third year in junior high school is considered “superior”, that from the first to third years in high school is considered “adequate”, and that equal to the first year in university and over is considered “inadequate” (Noro, 2009).

One of the 23 items (item 3A [a], which assesses a cover page) was not scored in this study because the newspapers did not have cover pages.

The HBM: Based upon previous content analysis using the framework of the HBM (Mackert and Love 2011; Tian et al., 2014), message coding guidelines were created to assess the presence or absence of specific messages related to HBM constructs of perceived susceptibility, perceived severity, perceived benefits, and perceived barriers of screening addressed (Table 2). The number and percentage

Table 2. Message Coding Guidelines of the Health Belief Model

Category	Subcategory	Description
Perceived susceptibility	In the general population	Statements regarding the frequency or risk of cancer in the general population.
	In the specific population	Statements regarding the frequency or risk of cancer in a specific population, such as smokers and those who have a family history of cancer.
Perceived severity	Focusing on consequences of medical/clinical conditions	Statements regarding medical outcomes if cancer screening is not performed (e.g., cancer metastasis and physical burden of a major operation).
	Focusing on consequences of social conditions	Statements regarding the social consequences if cancer screening is not performed (e.g., a layoff, a large medical cost, and psychological distress of family).
Perceived benefits	Focusing on consequences of medical/clinical conditions	Statements regarding the medical/clinical benefits of obtaining cancer screening. (e.g., early detection and early treatment, and an increase in survival rate).
	Focusing on consequences of social conditions	Statements regarding the social benefits of obtaining cancer screening. (e.g., “Mental and economic burden is slight. You will be better able to take care of your family by remaining healthy”).
Perceived barriers	Asymptomatic	Statements encouraging asymptomatic people to obtain cancer screening (e.g., “Cancer can progress without symptoms. You should have cancer screening even if you are healthy”).
	Time constraints	Statements encouraging busy people to obtain cancer screening (e.g., “It takes only an hour. You can choose the nearest hospital”).
	Fear for pain and side effects	Statements encouraging people who have fear for screenings, such as pain and side effects (e.g., “A screening does not take long and there is no pain”).

Table 3. Inter-rater Reliability of the Translated Japanese Version of the SAM Instrument (N=23)

Domain	Total agreement	Weighted kappa value	2 (superior) %	1 (adequate) %	0 (not suitable) %	Not applicable %
1. Content						
(a) Purpose	86.9	0.51	91.3	8.7	0	0
(b) Content topics	82.6	-0.07	91.3	8.7	0	0
(c) Scope	95.6	0	97.8	2.2	0	0
(d) Information	73.9	0.38	30.4	69.6	0	0
(e) Summary and review	78.2	0.57	0	0	58.7	41.3
2. Literacy demand						
(a) Reading grade level	100	1	91.3	8.7	0	0
(b) Writing style	91.3	0.67	84.8	2.2	2.2	10.8
(c) Vocabulary	91.3	0.75	19.5	78.3	2.2	0
(d) Sentence construction	78.2	0.21	84.8	10.9	4.3	0
(e) Advance organizers	82.6	0.27	87	2.2	6.5	4.3
3A. Graphics						
(a) Cover graphics	100	-	0	0	0	100
(b) Type of illustrations	69.5	0.49	54.4	15.2	0	30.4
(c) Relevance of illustrations	91.3	0.82	65.2	4.4	30.4	0
(d) Explanations and directions in graphs and charts	65.2	0.42	52.1	4.4	2.2	41.3
(e) Caption	82.6	0.66	56.5	0	2.2	41.3
3B. Layout/typography						
(a) Layout	78.2	0.31	80.4	19.6	0	0
(b) Typography	78.2	0.18	84.8	15.2	0	0
(c) Subheadings or "chunking"	91.3	-0.04	95.7	4.3	0	0
4. Learning stimulation/motivation ^a						
(a) Interaction	95.6	0.83	0	15.2	84.8	0
(b) Desired behavior patterns are modeled	78.2	0.35	17.4	2.2	80.4	0
(c) Self-efficacy and motivation	86.9	0.72	37	63	0	0
(d) Consideration of readers' anxiety	100	0	100	0	0	0
(e) Respect for readers	100	0	100	0	0	0
Overall	83.7	0.71	61.5	15.3	11.6	11.5

^aInteraction with readers/presenting of models/enhancing self-efficacy

of articles that conveyed sentences that matched each coding category were calculated. Additionally, the number, mean value, maximum, and minimum of sentences that matched each coding category were described.

Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences version 21.0 (SPSS, Chicago, IL, USA). Inter-rater reliability was assessed using the weighted kappa values for the SAM and the intraclass correlation coefficient for the HBM coding. A Guideline of Landis and Koch (1977) provided the basis for interpretation of the reliability estimates as follows: 0 to 0.20 represents slight agreement, 0.21 to 0.40 is fair agreement, 0.41 to 0.60 is moderate agreement, 0.61 to 0.80 is substantial agreement, and greater than 0.80 is

almost perfect agreement.

The study was granted an exemption from requiring ethics approval by the ethical review committee at the Graduate School of Medicine, The University of Tokyo.

Results

Inter-rater reliability

As Table 3 shows, of the 22 SAM items rated in the present study, there was perfect agreement (weighted kappa value of 1) for one item, almost perfect agreement (values of 0.81–0.99) for two items, substantial agreement for four items (values of 0.61–0.80), moderate agreement for four items (value of 0.41–0.60), fair agreement for five items (values of 0.21–0.40), and slight agreement for one item (values of 0–0.20). Three items had a weighted kappa

Readability, Suitability, and Health Content Assessment of Cancer Screening Announcements in Municipal Newspapers in Japan value of 0.00. Two items had a weighted kappa value of less than 0. The weighted kappa value of the overall SAM category was 0.71, which indicated substantial agreement. The inter-rater reliabilities of each category of HBM coding ranged from adequate to almost perfect (Table 3).

Characteristics of materials

Of the 129 articles that were evaluated, the number of letters in the articles varied from 91 to 6492. The contents of the articles included announcement of the date and time, location, cost of cancer screenings, recommendation to use screenings, and general information regarding cancer. The types of cancer that featured in the newspapers were mostly gastric, lung, colorectal, cervical, breast, and prostate cancers.

The SAM

Table 4 shows assessment of the suitability of the 129

Table 4. Assessment of Suitability of the Articles (N=129)

Domains and items	Distribution of rated points, n (%)				Mean score of a domain (SD)
	2	1	0	Not applicable	
1. Content					
(a) Purpose	113 (87.6)	13 (10.1)	3 (2.3)		82.3 (8.7)
(b) Content topics	123 (95.3)	4 (3.1)		2 (1.6)	
(c) Scope	129 (100)				
(d) Information	7 (5.4)	108 (83.7)	14 (10.9)		
(e) Summary and review			14 (10.9)	115 (89.1)	
2. Literacy demand					
(a) Reading grade level	120 (93)	9 (7)			89.3 (9.4)
(b) Writing style	106 (82.1)	2 (1.6)	1 (0.8)	20 (15.5)	
(c) Vocabulary	51 (39.5)	77 (59.7)	1 (0.8)		
(d) Sentence construction	108 (83.7)	8 (6.2)		13 (10.1)	
(e) Advance organizers	72 (55.8)	13 (10.1)	3 (2.3)	41 (31.8)	
3A. Graphics					
(a) Cover graphics				129 (100)	19.0 (37.9)
(b) Type of illustrations	17 (13.2)	8 (6.2)		104 (80.6)	
(c) Relevance of illustrations	23 (17.8)	3 (2.3)	103 (79.9)		
(d) Explanations and directions in graphs and charts	12 (9.3)	2 (1.6)	1 (0.8)	114 (88.3)	
(e) Caption	14 (10.9)		1 (0.8)	114 (88.3)	
3B. Layout/typography					
(a) Layout	93 (72.1)	36 (27.9)			89.9 (14.6)
(b) Typography	100 (77.5)	29 (22.5)			
(c) Subheadings or "chunking"	115 (89.1)	12 (9.3)		2 (1.6)	
4. Learning stimulation/motivation^a					
(a) Interaction		3 (2.3)	126 (97.7)		51.2 (5.6)
(b) Desired behavior patterns are modeled	3 (2.3)	1 (0.8)	125 (96.9)		
(c) Self-efficacy and motivation	9 (7)	120 (93)			
(d) Consideration of readers' anxiety	128 (99.2)	1 (0.8)			
(e) Respect for readers	129 (100)				
Mean score overall (SD)					73.1 (5.9)

^aInteraction with readers/presenting of models/enhancing self-efficacy etc

articles. The mean overall SAM score was considered superior (73.1%). The mean domain SAM scores of content, literacy demand, and layout/typography were considered superior (82.3%, 89.3%, and 89.9%, respectively). The mean domain SAM score of graphics was inadequate (19.0%) and that of learning stimulation/motivation was adequate (51.2%). The readability (item 2 [a] in Table 1) score was considered superior in 93% of the articles.

The HBM

Table 5 shows assessment of the HBM coding. Of the 129 articles that were evaluated, 23 (17.8%) articles conveyed messages of perceived susceptibility in the general population, 47 (36.4%) articles conveyed messages of perceived medical/clinical benefits, and 23 (17.8%) articles conveyed messages of perceived barriers of no subjective symptoms. Seven (5.4%) articles

Table 5. Summary of Content Analysis Within the Framework of the Health Belief Model (N=129)

Category	Inter-rater reliability		Articles		Sentences			
	ICC	95% CI	N	%	N	Mean value (SD) ^a	Maximum	Minimum
Perceived susceptibility								
In the general population	0.92	0.83-0.96	23	17.8	48	2.0 (1.5)	7	1
In the specific population	0.65	0.34-0.83	8	6.2	17	2.1 (1.6)	6	1
Perceived severity								
Focusing on consequences of medical/clinical conditions	0.9	0.79-0.95	7	5.4	7	1 (0)	1	1
Focusing on consequences of social conditions	0.5	0.12-0.75	3	2.3	4	1.3 (0.5)	2	1
Perceived benefits								
Focusing on consequences of medical/clinical conditions	0.42	0.04-0.70	47	36.4	107	2.2 (1.9)	13	1
Focusing on consequences of social conditions	0.61	0.27-0.81	10	7.7	14	1.4 (0.9)	4	1
Perceived barriers								
Asymptomatic	0.85	0.68-0.93	23	17.8	38	1.6 (0.7)	3	1
Fear for pain and side effects	0.96	0.92-0.98	4	3.1	4	1 (0)	1	1
Time constraints	0.83	0.66-0.92	7	5.4	10	1.4 (1.1)	4	1

*ICC, Intraclass correlation coefficient; CI, confidence interval; ^aThe mean value of sentences per article conveying the sentences that matched each coding category

conveyed messages of perceived medical/clinical severity, three (2.3%) articles conveyed messages of perceived social severity, 10 (7.7%) articles conveyed messages of perceived social benefits, four (3.1%) articles conveyed messages of perceived barriers of fear of pain/side effects, and seven (5.4%) articles conveyed messages of time constraint.

Discussion

Our study showed that the municipal newspapers were generally well edited and properly laid out. Readability analysis showed that most of the articles were written at lower than the recommended reading level of the third year in junior high school. This result is not consistent with other studies showing that cancer education materials are pervasively written at too high a readability level for those with low literacy skills (Rees et al., 2003; Weintraub et al., 2004; Helitzer et al., 2009; Akansel and Aydin, 2011; Tian et al., 2014). The reason for this finding may be partly because municipal newspapers are edited and proofread under rigorous quality control to inform a wide range of readers. The mean SAM scores of content, literacy demand, and layout/typography domains were considered superior. The cancer screening information in municipal letters was considered to be readable and understandable, even for those with low HL. Although the mean domain SAM score of graphics was inadequate, this was because municipal newspapers tended to be limited in space and used few illustrations or photographs.

In the current study, the mean SAM score of the domain of learning stimulation/motivation was low. Interaction with readers, indication of the models of obtaining cancer screening, and elaboration to enhance readers' self-efficacy were insufficient (items 4 [a], 4 [b],

and 4 [c]). These findings are consistent with previous studies (Weintraub et al., 2004; Helitzer et al., 2009; Akansel and Aydin, 2011; Tian et al., 2014). With regard to interaction with readers, curiosity is aroused when attention becomes focused on a gap in one's knowledge, and the curious individual is motivated to obtain the missing information and to learn (Lowenstein, 1994). The posing of questions confronts the reader directly with missing information and is considered to be the most straightforward inducer of curiosity (Lowenstein, 1994). Therefore, problems or questions should be presented for readers, or a question-and-answer format could be used to discuss problems and solutions (Doak et al., 1996b). With regard to indication of the models, people often learn by observing others' behavior as a model and imitate the behavior (Bandura, 1986). Additionally, concrete texts are more understandable, memorable, and interesting than abstract texts (Sadoski et al., 2000). Therefore, instruction models and specific, familiar instances of behavior should be presented in education materials for patients (Doak et al., 1996b). Narrative texts are also considered to work as models and to promote health behavior by evoking images that can be recalled, recognized, and responded to (Green and Brock, 2002). In fact, studies have shown that narrative messages have a persuasive effect on promoting health behavior (Wit et al., 2008; Kreuter et al., 2010). Using the concept of self-efficacy is an effective means of promoting health behavior (Bandura, 1977). In fact, self-efficacy is associated with obtaining cancer screening (Fouladi et al., 2013; Avci et al., 2014; Taymoori et al., 2014). According to self-efficacy theory, behavior is influenced by expectancy of outcome and efficacy (Bandura, 1977). Therefore, people are more motivated to act when they believe the behavior is achievable by them and that the behavior can influence the outcome

of the situation. Consequently, to enhance self-efficacy and promote health behavior, health messages should be conveyed plainly so that readers feel that they can understand the content and perform the required health behavior (Doak et al., 1996b). Additionally, the positive outcome of the behavior (i.e., obtaining cancer screening) should be made available to the readers.

According to the HBM coding, medical benefits of screening, perceived susceptibility in the general population, and encouragement of asymptomatic people to have screenings were mentioned to some extent. Many studies showed that adherence to cancer screening was significantly associated with greater perceived susceptibility, higher benefits, and lower barriers (Abbaszadeh et al., 2007; Allahverdipour and Emami, 2008; Hilmi et al., 2010; Allahverdipour et al., 2011; Baysal and Polat, 2012; Fouladi et al., 2013; Tsunematsu et al., 2013; Yilmaz et al., 2013; Avci et al., 2014; Shiryazdi et al., 2014; Taymoori et al., 2014). Therefore, the articles that mentioned these HBM constructs might have some persuasive effect on encouraging readers to have screenings. However, the percentage of the articles that mentioned susceptibility, benefits, and barriers was small (36.4%, 17.8%, and 17.8%, respectively), and these could be increased.

The present study showed that perceived barriers of fear for pain and side effects were addressed in only four articles (3.1%). Nevertheless, previous studies have shown that fear for pain is a strong barrier, especially in cervical cancer screening (Esin et al., 2011; Demirtas and Acikgoz, 2013; Ersin and Bahar, 2013). Statements to rid the reader of fear should be added, such as explaining the inspection method and safety. Only seven (5.4%) articles mentioned that the time required though time constraints (e.g., being busy) is also a strong barrier (Boonpongmanee and Jittanoon, 2007; Allahverdipour et al., 2011). Statements to overcome the barriers of time constraints, such as descriptions of the time required, should be added.

In the current study, perceived severity was also scarcely mentioned (5.4% of articles mentioned clinical severity and 2.3% mentioned social severity). However, previous studies have shown that perceived severity is associated with adherence to cancer screening (Javadzade et al., 2011; Baysal and polat, 2012; Taymoori et al., 2014). Additionally, social benefits and social severity were not as well addressed as clinical benefits and clinical severity in the current study. This result is consistent with a previous study that assessed patient education materials on colorectal cancer screening (Tian et al., 2014). The finding that social benefits and social severity are not well addressed still occurs despite the fact that cancer has a large effect on a person's life, and the belief that cancer changes life is a major reason for obtaining cancer screening (Ma et al., 2013). The messages conveying severity and social content should be increased.

The main limitation of the present study is the descriptive design. Future studies need to assess the extent to which the constructs of the SAM and the HBM of municipal newspaper articles affect the reader's attitude, intention, and behavior to obtain cancer screening.

In the present study, the weighted kappa values of the

SAM coding widely ranged from less than zero to 1. The reason for this finding might be partly because municipal newspapers were well written and the distribution of rating points in the categories of content, literacy demand, and layout/typography was skewed to 2 (superior) (Table 1). Future studies should evaluate the inter-rater reliability of the Japanese version of the SAM using a wider variety of materials. The other possible reason for our finding could be due to the subjective rating criterion of the Japanese version of the SAM. Items 2 (d), 2 (e), 3B (a), and 3B (b) had low weighted kappa values. The rating of these items can be influenced by the rater's subjective view, and should be rated and interpreted with caution.

Because this study used municipal newspapers from 23 Tokyo wards, the extent that the present findings are generalizable to cancer screening information announcements in other cities is unclear. Future studies need to assess the readability, suitability, and health content of cancer screening information in newspapers inside/outside Japan.

Cancer announcement articles of municipal newspapers in Tokyo 23 wards were mostly well developed and were understandable, even for those with low HL. However, the articles should be improved in terms of learning stimulation/motivation and health content. Assessment using the Japanese version of SAM showed that interaction with readers, models of presented behavior, and consideration to enhance readers' self-efficacy were scarce. According to the framework of the HBM, the statements of perceived barriers of fear for pain and time constraints, as well as perceived severity, social benefits, and social severity, were rarely addressed.

To motivate readers to obtain cancer screening, articles in municipal newspapers should include interaction with readers (e.g., problems or questions are presented, or a question-and-answer format is used), present models of obtaining cancer screening (e.g., specific, familiar instances are used or narrative messages of experienced persons are presented), and enhance the readers' self-efficacy (e.g., making readers feel that they can understand the content and perform the required behavior, and informing the positive outcome of obtaining cancer screening). Additionally, cancer screening information should increase messages conveying the HBM constructs, especially messages overcoming barriers (i.e., fear for pain/side effects and time constraints), and messages of perceived severity, social benefits, and social losses.

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