Differing Perceptions of Public Librarians and Users in Assessing and Developing Korean Consumer Health Information

The purpose of this study is to evaluate and compare perceptions between public librarians and public library users and determine their preferences for quality Korean Consumer Health Information (CHI) websites, providing useful data for future CHI resource development and librarian CHI reference services. In this study, a group of librarians and users assessed health information resource sites that are searched by a relatively high number of users, based on the assessment criteria developed in preceding studies. First, there were significant differences between librarian and user groups in assessing health information resource sites, with the user group assessment being more rigorous. Second, the group that participated in criteria development gave higher points than the nonparticipant group in their site assessment. Third, this study analyzed the influence of librarians' experience in providing, and users' experience in searching for, health information. Although the differences were not significant, the more experienced groups gave higher points to both sites and criteria assessment than the ones with no experience. Through this study, a total of fifteen health information websites were assessed, and the results can be referred to by both librarians and users in public libraries and applied to other studies on resource assessment in the future. This study is the first study to deal with the assessment of CHI resources available to public librarians and users, as opposed to past studies, which have focused on general Internet users' assessment of CHI resources. This study is also the first Korean study that has assessed CHI resources available in public libraries.

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The number of users who access the Internet to obtain health information is growing rapidly.[1] In 2005, a survey demonstrated that 79 percent of US Internet users had had some experience using Consumer Health Information (CHI) during the previous year.[2] Furthermore, based on the data Kerner published in July 2005, statistics on US adults' Internet use show that 66 percent of those surveyed had used the Internet to search for health and exercise information, the second most common search behind news at 73 percent.[3] The Pew Internet and American Life Project reported in 2011 that health information is a very common search topic among Internet users; over 80 percent of them had searched online for some topic within this category, including information about specific diseases and treatments as well as food and drug safety, memory loss, pregnancy, and others.[4]

As can be seen in the data cited above, there are rapidly growing

numbers of both information resources available on the Internet and user requirements for the same. Therefore, to provide users with high-quality health information resources, studies on developing quality assessment criteria for information resources have been carried out. Results show that there are numerous health information assessment criteria developed by institutions and governments such as HONcode by the Medical Library Association (MLA) and the Health on the Net Foundation (HON), DISCERN by the British Library, and Information Quality Tool (IQT) by the Health Summit Working Group. In addition, there are also a large number of assessment criteria that have been developed by individual researchers.[5]

Khalil states that information is a product, that a library is the place where one can obtain health information cheaply and unobtrusively, and finally, that one of the ways through which a medical librarian of the Medical Library Association (MLA) can provide CHI is to create and accumulate CHI resources accessible on the Internet.[6] For example, public libraries in Canada, the Netherlands, and the United Kingdom have developed and provided collections of health information resources, including paper-based and electronic databases or website links, and on-site services.[7]

However, there are no such studies among Korean researchers, although a small number of researchers in the Health Science field have conducted research on health information assessment criteria for Internet users.[8] In addition, there are very few studies on the development of quality-assessed CHI resources that Korean public libraries can provide to users.[9] Therefore Korean public libraries have not been providing CHI resources that librarians and users can trust.

Facing the flood of online health information resources, what role should public libraries play in meeting users' needs for health information? The fact that health information is increasing rapidly implies that the amount of unreliable or incorrect health information is also growing quickly at the same time.[10] If so, what effort should public libraries make to prevent users from making an undesirable decision on the basis of inappropriate or inaccurate information?

First, public libraries need to strive to accumulate online health information to respond to users' needs.[11] They need to establish useful and accountable health information resources selected by public librarians, who are experts in information search and resource assessment, and provide them to users. To this end, public librarians need to receive CHI-related training,[12] and to seek partnerships with local hospitals, medical centers, or medical schools in providing CHI-related professional services.[13] Second, public libraries need to educate users so they can understand and make use of the assessment criteria.[14] Specifically, public librarians can educate users about how to determine high quality and reliable websites, how to find the latest research on a disease or disability, and how to find the certification information of other medical providers including doctors.[15]

To suggest ways for public libraries to achieve these goals, this study will review several assessment criteria that have

been developed so far and assess Korean health sites based on these criteria. In this study, a librarian group will compare information resource sites based on the assessment criteria developed in preceding studies, and the results will be compared to the results of a user group.[16] The assessed resources will be compiled as a website for both users and librarians. This study is the first Korean study that has assessed CHI resources available in public libraries and can therefore contribute to improving the quality of CHI services in Korea.

RESEARCH QUESTIONS

Many researchers in other countries have developed assessment criteria for health information resources and applied them to real site assessments.[17] However, there has not been any assessment study on CHI resources appropriate for public libraries conducted within Korea. This study used criteria developed in the first Korean study on assessment criteria development based on an opinion survey of public librarians and users to conduct information resource assessment research targeting librarian and user groups.[18]

This study aimed at comparing the perceptions of the librarian group and the user group in evaluating information resources. The research questions were as follows:

RQ1: How will the librarian groups' assessment differ from the user groups'?
RQ2: Will there be any difference between the librarian group that was involved in developing the assessment criteria and the one that was not?
RQ3: Will the librarians' experience of providing health information service and the users' experience of health information search influence their assessment of health information resource websites?

To summarize, this study compared the differences between a user group and a librarian group, as well as between librarians who were and were not involved in developing assessment criteria, all while assessing information resources that can be accessed in public libraries. This study was designed so that the research questions would be answered during the discussion process.

RESEARCH AND ANALYSIS METHODS

This study tried to assess information resources using assessment criteria developed in primary research to establish useful and reliable information resources for public librarians and users.[19] The information resource sites were introduced to the groups and each group was required to assess the site on a five-point scale. The procedures and methods of the study to achieve this purpose are as follows:

1. CHI websites to be evaluated by both a librarian group

Table 1. Selected Health Information Websites for Assessment

Site #	Website	URL
1	365homecare	www. 365homecare.com/main.html
2	eHospital	www.clinic.co.kr
3	Konkang in	http://hi.nhic.or.kr/portal/site/hi
4	Konkang Sam	www.healthkorea.net
5	Doctor	www.doctor.co.kr
6	Doctorkorea	http://duser.doctorkorea.com
7	Doctorcrezio	www.drcrezio.co.kr
8	MKhealth	www.mkhealth.co.kr
9	Medcity	www.medcity.com
10	Vitamin MD	www.vitaminmd.co.kr
11	Joins MSN health	http://healthcare.joinsmsn.com
12	Carecamp	www.carecamp.com/ccWeb/home/index.jsp
13	Komedi.com	www.kormedi.com/default.aspx
14	Hidoc	www.hidoc.co.kr
15	HealthChosun	http://health.chosun.com

Table 2. Assessment Criteria

Rank	Criteria	Categories
1	Accuracy	Content
2	Transparency	Information Providers
3	Currency	Content
4	Easy to Understand	Content
5	Authority	Information Providers
6	Responsibility	Information Providers
7	Accessibility	Interface Design

Assessor

Three groups took part in the survey portion of this study. The first group was a reference librarian group that consisted of ten librarians who were involved in the assessment criteria development in the primary research and agreed to participate in the assessment.[24] The second group consisted of twenty-one librarians who did not take part in the previous criteria development. This study contacted reference librarians from 180 Korean libraries providing health information service who were not involved in the first survey research, and from them twenty-one librarians agreed to participate in the site assessment. The user group was composed of twenty-three students from the library and information science program at Konkuk University. The students were encouraged to take part in the survey voluntarily, as the survey would take more than one hour.

Assessment Criteria

Although there are numerous studies on assessment criteria, the criteria used in this study were developed in a previous Korean study through an opinion survey of public librarians and users. In this previous study, 56 librarians and 592 users were involved, and the criteria that were the most highly evaluated from both groups were selected. As a result, seven assessment criteria were developed, and they are divided into the categories of health information content, health information provider, and website design.[25] Table 2 demonstrates the assessment criteria used in this study.

and a user group were selected.

2. Public librarians and public library users were selected as evaluators of the CHI websites.
3. The evaluators assessed CHI resources using the evaluation criteria developed in a previous study, based on the perceptions of public librarians and users.[20]
4. Any differences in the assessment between the groups of public librarians and users, especially in perception about sites' rankings and the assessment items, were compared.

Selection of Websites for Assessment

Referring to preceding study results and rankey.com, a portal that ranks Korean sites, fifteen information resources were selected for assessment in this study.[21] The site selection process was as follows:

First, results from a previous study show that there are ninety health-related websites linked to by public library homepages nationwide.[22] Among them, only one site is linked to by more than two libraries (Konkang In [Health In], linked to by thirteen libraries), while sixteen sites are linked to by two libraries and the others are linked to by only one library.

Second, this study chose the first twenty sites from the rankey.com portal. At rankey.com, there were sixty total websites ranked in the health/medicine portal on August 1, 2011. We chose the sites that were both linked to by more than two libraries and ranked within the first twenty places at the health/medicine portal. Using these two criteria, fifteen sites were selected, as can be seen in table 1.

This study referred to previous research for selection method and found that most studies used a similar approach.[23]

LITERATURE REVIEW

Evaluating the quality of consumer health information is of greater importance than establishing it in the first place because information related to health is beneficial when it is correct but can cause serious harm when it is not.[26] Various assessment criteria to define the quality of health information have been developed by several institutions and researchers, but there are some differences among them.

This study took a close look at the assessment criteria used in previous studies that assessed and established information resources. Because of the importance of this field

of information, much research in the past has concentrated on ascertaining the availability of health information in the public library. As early as 1968, this topic was being investigated through the public library's collection of CHI-related books.[27] This study found that the Boston Public Library was the first public library equipped with CHI books; in 1864, it possessed 28,604 volumes, which was more than the Boston Medical Library's 20,285. More recently, a 2004 study investigated the percentage of public libraries providing CHI resources and analyzed the present condition of CHI on US medical school library homepages.[28]

Accuracy and reliability are just as important as availability where health information is concerned; so many studies have also tested the limits of both. Li conducted assessment research on the currency of CHI books in the public library, and the results demonstrate that approximately 42 percent of the books surveyed were fewer than five years old and that there was no correlation between the number of books in a collection and newness.[29] Shaddock performed research on assessment on the quality of brochures published by Consumers' Association Treatment Notes.[30] In this study, trained assessors evaluated these CHI resources based on certain criteria. The assessment tools used in this study were DISCERN, the Flesch test, and the Centre for Health Information Quality's health information appraisal guidelines.

Online health information resources have also been the focus of many studies, as they are increasingly available to a wide range of users. Rees analyzed HealthInfoIowa (www.healthinfoiowa.org), an established CHI website, using research questions regarding how consumers can trust whether widespread CHI information on the Internet is correct and reliable, what criteria consumers need to decide the reliability of websites, and when and where consumers can get help regarding CHI information.[31] Burkell and Campbell analyzed CHI-related online information resources by applying certain assessment criteria and concluded that the majority of the sites investigated are neither 100 percent correct nor specific enough to support decision-making.[32] Therefore their study suggested that metadata needs to be developed and standardized for online information resources, as do standards which can be helpful in practical decision-making for health related issues. Based on this study, we have found a need to build CHI resources evaluated by certain criteria, and public libraries must provide user education to improve users' ability and knowledge in determining reliable CHI resources.

As well as assessing the state of CHI available to users, many of these studies also work to develop accurate and useful assessment criteria to aid librarians and users in their future searches. Kovacs set up a CHI-related electronic information resource designed to fulfil library users' information requirements and to develop a method for the establishment of web information resources.[33] Hasman and Chiarella further developed methodologies for establishing online information resources by creating a suffering-management information resource for cancer patients and their caregivers and making it available in CHI-related institutions and libraries,

including public libraries, using the Web 2.0 Wiki Principle.[34] Their study assessed each information resource by referring to the assessment criteria for online information resources, developed by themselves and *The Medical Library Association Consumer Health Reference Service Handbook*, and included the resources in their collection. Gray reviewed CHI information resources that can be used on the web, and tried to set up authoritative and reliable health information resources.[35] He discusses assessment in depth, and suggests sites, institutions, and standards which can be helpful for assessment such as *Diagnosing Websites, A User's Guide to Finding and Evaluating Health Information on the Web, Top Ten Most Useful Consumer Health Websites,* and *Complete Idiot's Guide to Online Medical Resources*. His study also includes some information resources selected based on these standards.

In many cases, other institutions have already created both resources and assessment criteria that would be beneficial to librarians as well. The AARP site provides rules that one needs to follow when evaluating the quality of medical information on the Internet and a checklist that can be used to know when assessing the information.[36] Certain CHI libraries have also been established specifically for special user groups as well as general users. For instance, when discussing the problems and gravity of adolescent obesity, Streeter introduced "Pathfinder for juvenile diabetes," which can be helpful for solving these issues.[37]

The results of the previous research mentioned above show that there are many studies which advocate for the necessity of and aid in the development of assessment criteria for information resources, and which actually perform assessments of health information resources to provide consumers with high quality CHI information in a world where the amount of CHI information is rapidly increasing.[38] According to these previous studies, which analyzed the status of CHI resources in public libraries,[39] even though institutions like the Boston Public Library have built a relatively extensive collection of offline CHI-related books,[40] the ratio of public libraries providing CHI-related resources through their homepage was very low.[41] In addition, the resources available may be problematic. For example, studies for assessing CHI resourcesfound that among online CHI resources, details, reliability, timeliness, and accuracy are not high, thus concluding that standardization of assessment guidelines and construction methods are needed.[42] In particular, some researchers have suggested that librarians construct and use CHI resources jointly to solve the difficulties in assessing numerous sites.[43] The AARP site in particular offers general rules to follow for evaluating the quality of medical information on the Internet and provides a checklist of the things to know about judging that information. By screening and reviewing all sites for which links are included, the organization has acted as a medical librarian using quality filtering and reliable resource checking before making recommendations to users.[44]

CHI resources at a public library should include CHI-related books, CHI-related website links, and CHI-related

Table 3. Survey on Assessing Consumer Health Information

Subject Area	List of Contents	Estimate
Assessment Criteria (for users and librarians)	Accuracy Transparency Currency Easy to Understand Authority Responsibility Accessibility	5-point Likert Measure
Personal Background of Respondents	Gender (Users and Librarians) Age (Users and Librarians) Terminal Academic degree (Users and Librarians) Service provision (Librarians) Certificates of Qualification (Librarians) Job Function (Librarians) Experience of CHI services (Users and Librarians)	( ) indicates target group

databases. The public library can also provide a core book list related to CHI or a reference resource list following classified subjects. When setting up such information resources and systems, the public library needs to screen and collect resources carefully based on particular assessment criteria, and there are many studies related to this. However, there are hardly any assessment studies on health information resources preferred by public library users and librarians both internally and externally. For this reason, this study tried to discover the health information resources preferred by public library users and librarians, based on the assessment criteria appropriate for public libraries.

FINDINGS

Respondents' background and survey questions

The librarian groups were asked questions regarding their public libraries' current CHI service provision, their career and past CHI experiences, and demographic statistics; experience with health information service provision was used in crosstabs in this study. In the first group, composed from librarians who had participated in the previous study, 10 percent of the librarians, when asked about CHI service provision, answered that they updated the CHI information on their libraries' website 4–6 times a year, while 90 percent of them had no experience updating their website's CHI information. Regarding the question about how many times on average they receive enquiries about health from public library users during a week, 20 percent of them answered 1–3 times, another 20 percent answered 4–6 times, and 60 percent had no experience.

That is, the ratio of experience with providing health information among the first group of librarians is 40 percent experienced to 60 percent inexperienced. In the second group, composed of librarians who had not participated in the previous study, 9.5 percent answered that they have posted health-related information resources on their library websites 1–3 times a week, while 85.7 percent of them have no experience

and 4.8 percent of them did not answer. Regarding the question of how many times on average they receive enquiries on health from public library users during a week, 4.8 percent of them answered 1–3 times, 90.5 percent of them had no experience, and 4.8 percent of them did not answer. That is, the ratio of experience of providing health information among the second group of librarians is 9.5 percent experienced to 90.5 percent inexperienced. This ratio for the librarian group as a whole is therefore 24.75 percent experienced to 75.25 percent inexperienced.

The user group was asked questions regarding their health, experience of health information use, and demographic characteristics; once again, experience with searching for health information resources was used for crosstabs. Users were asked how often on average they search for health information using the Internet during a week, and 58.3 percent of them answered they do not search for such information, while 37.5 percent and 4.2 percent of them answered 1–2 days and 3–4 days a week, respectively. That is, the ratio of experience with searching for health information among the users was 58.3 percent experienced to 41.7 percent inexperienced.

The questionnaire items in the survey were categorized into two subject areas: assessments criteria that are measured by a 5-point Likert scale and respondents' personal background. The two areas along with items making up the list of the survey contents are shown in table 3.

Site Assessment Results

Overall Ranks of Assessed Sites

This study analyzed the overall ranks of the assessed fifteen sites, based on the average of the three groups' responses. As a result, all of the sites except one received more than 3 in 5-point Likert scales. Among them, "Konkang (health) in" obtained the highest points, followed by "HealthChoSun"

Table 4. Ranks of Assessed Sites

Assessment Criteria	Site number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Accuracy	3.72	3.10	3.80	3.90	3.46	3.40	3.02	3.66	3.26	3.56	3.32	3.40	3.46	3.82	3.66
Transparency	3.60	3.00	3.78	3.34	3.16	3.24	3.06	3.40	3.16	3.42	3.34	3.44	3.36	3.41	3.61
Currency	3.92	3.26	3.72	3.56	2.82	2.88	2.76	3.82	3.22	3.56	3.42	3.63	3.72	3.86	3.80
Easy to Understand	3.80	3.06	3.82	3.60	3.16	2.94	2.96	3.50	3.20	3.54	3.62	3.32	3.46	3.42	3.46
Authority	3.38	2.96	3.74	3.46	3.06	3.04	2.88	3.38	2.94	3.28	3.36	3.14	3.38	3.68	3.60
Responsibility	3.28	3.00	3.50	3.34	3.24	3.06	2.76	3.14	3.16	3.20	3.28	3.28	3.48	3.42	3.50
Accessibility	3.52	3.12	3.80	3.64	3.38	3.04	3.02	3.52	3.36	3.44	3.02	3.47	3.44	3.42	3.78
Mean	3.6029	3.0714	3.7371	3.5486	3.1829	3.0857	2.9229	3.4886	3.1857	3.4286	3.3371	3.3776	3.4714	3.5776	3.6305
STD	0.6358	0.7826	0.6372	0.643	0.6757	0.6824	0.7444	0.6184	0.71	0.595	0.6931	0.7192	0.691	0.7144	0.6498
Rank	3	14	1	5	12	13	15	6	11	8	10	9	7	4	2

Table 5. Differences in Perception between Groups in Site Assessment (3 Groups)

Site #	Names of the Websites	Participant Librarian Group in Criteria Development			Nonparticipant Librarian Group in Criteria Development			User Group			F Value	Pr > F
		MEAN	STD	rank	MEAN	STD	rank	MEAN	STD	rank		
1	365homecare	4.1143	0.6274	3	3.5804	0.6629	4	3.4048	0.5154	4	5.16	0.0094
2	eHospital	2.9857	1.1054	14	3.3036	0.8130	11	2.9524	0.5832	14	1.04	0.3603
3	Konkang in	4.4857	0.3173	1	3.6786	0.6072	1	3.4643	0.5112	1	14.06	<.0001
4	Konkang Sam	4.2000	0.5683	2	3.3839	0.6144	10	3.3869	0.5270	5	8.34	0.0008
5	Doctor	3.3857	0.9620	11	3.1607	0.6996	12	3.1131	0.5176	11	0.58	0.5655
6	Doctorkorea	3.1286	0.9096	13	3.0804	0.6959	13	3.0714	0.5928	12	0.02	0.9758
7	Doctorcrezio	2.7571	0.8808	15	3.0804	0.7876	13	2.8869	0.6647	15	0.62	0.5401
8	MKhealth	3.8714	0.7867	7	3.5357	0.6463	7	3.2976	0.4437	7	3.41	0.0413
9	Medcity	3.2857	1.0880	12	3.0804	0.7265	13	3.2143	0.5038	9	0.29	0.7524
10	Vitamin MD	3.7143	0.7377	8	3.4821	0.6957	8	3.2738	0.4039	8	2.12	0.131
11	Joins MSN Health	3.7143	0.8518	8	3.5714	0.6238	5	3.0238	0.5323	13	5.8	0.0056
12	Carecamp	3.9000	0.8626	6	3.4464	0.6343	9	3.1141	0.5949	10	5.03	0.0104
13	Komedi.com	3.6857	0.8215	10	3.5446	0.6705	6	3.3333	0.6453	6	1.05	0.3573
14	Hidoc	3.9143	0.9065	5	3.6176	0.7309	3	3.4107	0.5812	3	1.85	0.168
15	HealthChosun	4.0571	0.7259	4	3.6756	0.5630	2	3.4226	0.6009	2	3.81	0.0292
Average		3.6800	0.8101		3.4148	0.6781		3.2247	0.5478		3.5453	0.2819

(3.63), "265 Homecare" (3.60), "Health MBC" (3.58), and "KonkangSam (Health Spring)" (3.55), with "DoctorPregio" (2.9) gaining the lowest points (table 4).

Differences in Perception between the Three Groups

This study analyzed whether there are differences in perception among groups and identified the perception differences in seven sites (1, 3, 4, 8, 11, 12, 15) out of fifteen, which is almost 50 percent of the total. The sites toward which respondents showed significant perception differences with a significance level of 0.05 can be found in table 5. In assigning points for each site, the first librarian group that participated in the assessment criteria development gave the highest points (on average, 3.68), followed by the second librarian group that did not participate in criteria development (on average, 3.4148), and the user group (on average, 3.2247). Meanwhile, regarding deviation within groups, it was also the first librarian group that showed the highest deviation (on

Table 6. Differences in Perception between Groups in Each Assessment Criteria (3 Groups)

Assessment Criteria	Participant Librarian Group in Criteria Development		Nonparticipant Librarian Group in Criteria Development		User Group		F Value	Pr > F
	MEAN	STD	MEAN	STD	MEA	STD		
Accuracy	3.8133	0.5878	3.5667	0.6604	3.3306	0.4036	3.05	0.0566
Transparency	3.64	0.8232	3.4064	0.626	3.2028	0.3475	2.25	0.117
Currency	3.78	0.496	3.4708	0.6434	3.3248	0.4386	2.68	0.0791
Easy to Understand	3.8667	0.5718	3.4	0.5198	3.1861	0.4426	6.68	0.0028
Authority	3.54	0.6692	3.3	0.5095	3.1694	0.3985	1.98	0.1497
Responsibility	3.3867	0.6561	3.3	0.5688	3.1444	0.3994	0.93	0.401
Accessibility	3.7333	0.6078	3.4583	0.6763	3.2163	0.399	3.35	0.0436
Average	3.68	0.630271	3.4146	0.6006	3.224914	0.404171	2.988571	0.1214

Table 7. Differences in Perception between Librarians and Users

Site #	Librarian Group			User Group			F Value	Pr > F
	MEAN	STD	Rank	MEAN	STD	Rank		
1	3.7857	0.6896	3	3.4048	0.5154	4	4.83	0.0328
2	3.1813	0.9281	12	2.9524	0.5832	14	1.07	0.3062
3	3.9890	0.6464	1	3.4643	0.5112	1	10.02	0.0027
4	3.6978	0.7118	5	3.3869	0.5270	5	3.04	0.0877
5	3.2473	0.7996	11	3.1131	0.5176	11	0.49	0.4887
6	3.0989	0.7675	14	3.0714	0.5928	12	0.02	0.8886
7	2.9560	0.8229	15	2.8869	0.6647	15	0.11	0.7465
8	3.6648	0.7079	6	3.2976	0.4437	7	4.74	0.0345
9	3.1593	0.8679	13	3.2143	0.5038	9	0.07	0.7877
10	3.5714	0.7068	10	3.2738	0.4039	8	3.27	0.077
11	3.6264	0.7069	7	3.0238	0.5323	13	11.44	0.0014
12	3.6209	0.7483	8	3.1141	0.5949	10	6.95	0.0113
13	3.5989	0.7194	9	3.3333	0.6453	6	1.88	0.1771
14	3.7317	0.7988	4	3.4107	0.5812	3	2.6	0.1133
15	3.8223	0.6448	2	3.4226	0.6009	2	5.12	0.0282

average, 0.8101), followed by the second librarian group (on average, 0.6781), and the user group (on average, 0.5478); see table 5.

This study then analyzed in which assessment criteria such perception differences can be seen. Table 6 demonstrates that with a significance level of 0.05 percent, significant differences were observed in only two criteria, "Easy to Understand" and "Accessibility." However, in general, the librarian group that developed the assessment criteria assigned low points for each criterion.

Differences in Perception between Librarians and Users

In this section, this study analyzed the perception differences in the assessment of each site between the librarian and user groups (see table 7). The results demonstrate that there are perception differences between groups in more than 50 percent of site assessments. The site numbers in which the differences were observed are 1, 3, 4, 8, 10, 11, 12, and 15, identical to the previous analysis, except with the addition of site number 10. The user group also gave much lower points than the librarian group for each site. This finding indicates

Table 8. Differences in Perception between Librarians and Users

Assessment Criteria	Librarian Group		User Group		F Value	Pr > F
	MEAN	STD	MEAN	STD		
Accuracy	3.6615	0.6333	3.3306	0.4036	4.76	0.034
Transparency	3.4963	0.7018	3.2028	0.3475	3.42	0.0706
Currency	3.5897	0.6004	3.3248	0.4386	3.13	0.0832
Easy to Understand	3.5795	0.5774	3.1861	0.4426	7.22	0.0099
Authority	3.3923	0.5754	3.1694	0.3985	2.49	0.1209
Responsibility	3.3333	0.5924	3.1444	0.3994	1.72	0.1962
Accessibility	3.5641	0.6527	3.2163	0.399	5.06	0.0291
Average	3.516671	0.619057	3.224914	0.404171	3.971429	0.0777

Table 9. Differences in Perception between Participant and Nonparticipant Group in Assessment Criteria Development

Site #	Participant Librarian Group in Criteria Development			Nonparticipant Librarian Group in Criteria Development			F Value	Pr > F
	MEAN	STD	Rank	MEAN	STD	Rank		
1	4.1143	0.6274	3	3.5804	0.6629	4	4.15	0.0527
2	2.9857	1.1054	14	3.3036	0.8130	11	0.71	0.4066
3	4.4857	0.3173	1	3.6786	0.6072	1	14.95	0.0007
4	4.2000	0.5683	2	3.3839	0.6144	10	11.48	0.0024
5	3.3857	0.9620	11	3.1607	0.6996	12	0.48	0.4963
6	3.1286	0.9096	13	3.0804	0.6959	13	0.02	0.8799
7	2.7571	0.8808	15	3.0804	0.7876	13	0.95	0.3401
8	3.8714	0.7867	7	3.5357	0.6463	7	1.41	0.2472
9	3.2857	1.0880	12	3.0804	0.7265	13	0.34	0.5679
10	3.7143	0.7377	8	3.4821	0.6957	8	0.65	0.4264
11	3.7143	0.8518	8	3.5714	0.6238	5	0.24	0.626
12	3.9000	0.8626	6	3.4464	0.6343	9	2.39	0.1355
13	3.6857	0.8215	10	3.5446	0.6705	6	0.23	0.6364
14	3.9143	0.9065	5	3.6176	0.7309	3	0.84	0.3674
15	4.0571	0.7259	4	3.6756	0.5630	2	2.26	0.1455

that users of data are more demanding than collectors of data. Therefore, librarians should be collecting CHI resources more thoughtfully and more stringently and building CHI-related databases based on users' demands.

This study then analyzed in which assessment criteria such perception differences were seen. Table 8 demonstrates that with a significance level of 0.05 percent, the significant differences were observed in three criteria—"Accuracy," "Easy to Understand," and "Accessibility." That is, in approximately 43 percent of the criteria, groups are showing differences in their perception. Users also gave comparatively low points in the assessment compared to the librarian group.

Differences in Perception between Participant and Nonparticipant Group in Assessment Criteria Development

This study analyzed whether there were differences in perception between groups that were and were not involved in assessment criteria development when they assessed each site (table 9). The data reveals that there are only three sites (1, 3, 4) regarding which these two groups show differences in their perception (20 percent difference).

This study then analyzed in which assessment criteria such perception differences were seen. Results show that with a significance level of 0.05 percent, a significant difference

was observed in only one criterion (Easy to Understand), but the figure of difference was not very large at only 0.0423. That is, it can be said that the participation in criteria development did not influence the assigning of points for each site in the assessment based on the same criteria. However, although the difference was not significant, the participant librarian group in criteria development gave higher points than the nonparticipant group in their assessment.

The Influence of Search Experience for Health Information Resources on Assessment

In this section, this study analyzed whether experience searching for health information resources influenced librarians' and users' site assessment. The analysis was conducted in two groups of librarians and users rather than separating the librarians as participants and non-participants in assessment criteria development.

Analysis of Librarian Group

This study analyzed whether the experience of health information resource use significantly influenced site assessment *per se* or the number of points assigned for each assessment criteria. The questions regarding the experience of the librarian group can be summarized as follows: first, whether they have posted health-related information resources on their public library websites, and second, whether they have had enquiries from public library users on health and dealt with those enquiries.

First, this study found that the influence of health information resource service experience on ranking the sites was not significant. However, librarians who had CHI service experience assigned lower points in site assessment.

This study also analyzed whether the experience of providing health information resources influenced each assessment criteria in the librarian group. The results demonstrated that there was no significant difference between groups with and without such experience in all criteria, but although the difference was not significant, librarians who had CHI service experience gave lower points.

Analysis of User Group

This study analyzed whether users' experience of using health information resources influenced site assessment *per se* or the number of points given to each assessment criteria. The question designed to measure the experience of the user group was worded as "whether they have used health information resources on the Internet."

First of all, this study analyzed the influence of health information search experience on ranking sites and found that CHI search experience did not have significant influence on site ranking. However, users who had CHI search experience

assigned lower points in their site assessment. Though this result is similar to the results from the analysis of the librarian group, the influence of experience was stronger in the user group than it was in the librarian group.

This study also analyzed whether the experience of health information resource search influenced each assessment criteria in the user group. The results demonstrated that there was no significant difference between groups with and without such experience in all criteria, but although the difference was not significant, users who had CHI search experience gave lower points. This finding is also similar to the librarian group's results.

DISCUSSION AND FUTURE STUDY

Discussion

As recognition of the necessity of CHI service is spreading, several studies on assessment criteria have been conducted to assess consumer health information resources on national, institutional, and research levels from various angles. Furthermore, as this study examined in the literature review section, there are many studies that have actually assessed sites according to developed assessment criteria, and these studies assessed different types of health information resources in various aspects. This topic is of great importance because health information resources, which can so directly impact life, require a much higher level of reliability, accuracy, and authority compared to other information resources. Therefore, studies on health information resources should be continued to provide users with rich and accountable health information resources throughout the world.

First and foremost, this study analyzed whether there were differences in strictness of assessment between user group and librarian group by first assessing the overall assessment mark of health information sites and by second analyzing whether there were differences between groups for each criterion. In the results, there was a significance difference between the librarian group and user group in assessing health information sites, that is, the user group was much more rigorous in its assessment than the librarian group. This implies that when librarians decide to post a site on their library homepages because they think it is a quality resource, user satisfaction may not reach the expected level. Therefore, librarians need to assess health information resource sites more carefully. For example, librarians need to assess health information resource sites based on certified guidelines and assessment criteria. In addition, it would be highly effective if public libraries would organize an expert group by consulting with medical experts in each field, constructing a CHI resources database based on the sites that expert groups rank very highly, and utilize it jointly.

Second, this study analyzed in which criteria significant differences between librarian and user groups were observed. In all assessment criteria, the user group gave lower points than the librarian group did, and among them, significant

differences were observed in the criteria of "Accuracy," "Easy to Understand," and "Accessibility." This result implies that users have difficulties in accessing consumer health information and understanding the contents, while wondering whether the information is correct. On the other hand, it is understood that librarians do not find much difficulty in accessing, understanding, and evaluating the accuracy of information resources. Therefore, when librarians develop health information resources, they need to develop and provide guidelines to help users to access and understand these resources more easily, while conducting health literacy education for users at the same time. Many studies claim the need for standards or guidelines so that users can analyze and evaluate the provided resources by themselves.[45] In fact, resources recommended as guidelines for librarians and users to refer to are *Diagnosing Websites*, *A User's Guide to Finding and Evaluating Health Information on the Web*, *Top Ten Most Useful Consumer Health Websites*, *Complete Idiot's Guide to Online Medical Resources*, and *The Medical Library Association Consumer Health Reference Service Handbook*. Improving users' health information literacy means improving the users' ability to be aware of their health information needs, identify useful information with the proper information retrieval process, and take advantage of their findings.[46] These goals require librarians to educate users so that they can have the ability to evaluate the quality of the retrieved information, apply it appropriately to particular circumstances, and analyze and understand health information for making health-related decisions.[47] Therefore, public librarians have to receive CHI-related education so that they in turn can educate users,[48] and strive to improve users' information literacy in various ways.[49] Actually, Connecticut public libraries developed the Healthy Web Site, which provides (1) an evaluation method to identify high quality and reliable websites, (2) information on current research on a particular disease or disorder, and (3) sources for finding certification information on medical providers including doctors.[50] Similarly, training for users is also being conducted by the WebHealth for Seniors project which the NNLM and Southeastern Atlantic Regional Medical Library cosponsored.[51] Also, education targets can be subdivided into education for disadvantaged groups,[52] education for elderly people,[53] and education for minorities such as African American or Hispanic groups through the diversification of teaching methods.[54] Programs in which parents and children can participate together,[55] outreach programs,[56] and so on also can be beneficial.

Third, in the previous study, approximately thirty assessment criteria were suggested, and from them, seven final criteria were selected. It was possible that librarians who participated in criteria development may have different opinions during assessment compared with librarians who only took part in site assessment with the given criteria. There were three sites regarding which significant differences (20 percent difference) between groups were observed in average points, and, overall, the nonparticipant group assigned lower points. With regard to the number of points given to each criteria,

groups showed a significant difference in their assessment of the "Easy to Understand" criterion, and again, in general, points in the nonparticipant group were lower.

Finally, this study analyzed the influence of experience in librarians' providing and in users' searching for health information resources on the assessment, but there was no significant difference between the two groups in points given to both assessed sites and each assessment criterion at a significant level of 0.05 percent. However, in general, experienced groups assigned higher points than their counterparts. Based on this result, it can be assumed that the experience of health information resources has a positive effect in assessment by improving assessors' knowledge and comfort regarding the information and process. However, it is also possible that they felt a sense of ownership toward the sites, as they had done work on them previously.

Implications

The goal of this site assessment study was to develop and provide sites which public library users prefer the most and public librarians can refer to when they provide CHI-related services. A total of fifteen CHI sites were assessed, and it was found that they did not receive high points in the site assessment, although they are in ranked highly in terms of the number of visits. "Konkang (Health) in," which was linked to the most by public library websites, was the best site gaining 3.7371 points, though this rank is different from rankey.com's. It implies that the development of CHI information resources that can meet the requirements of public librarians and users rather than those of general Internet users is necessary for public libraries.

Conclusion

This study reviewed several recently developed assessment criteria and assessed Korean health websites following those criteria. This study asked a librarian group to compare information resource sites based on certain criteria, compared the results with those of the user group, and developed the assessed information resources as websites that both users and librarians can refer to. This study was the first Korean study that has assessed CHI resources available in public libraries. We hope this study will encourage other assessment studies on CHI resources in other countries.

However, it has the limitation of a few researchers assessing only a small number of CHI resources. In addition, individual public libraries may not have the person power to establish relevant information resources on their own. Smith reported that in many cases, librarians manage CHI-related websites, and these sites do not focus on graphics or cover a wide range of subjects, unlike frequently visited sites such as MEDLINE Plus.[57] Smith, however, argued that even developing and maintaining a small site requires extensive time and effort and suggested collaboration in establishing and sharing CHI resources as a solution.[58] Therefore, in the future, there needs to be further exploration of ways to develop and utilize

collaborative systems for setting up CHI resources based on Wiki technology. A Wiki is a freely expandable collection of interlinked webpages, a hypertext system for storing and modifying information—a database where each page is easily editable by any user with a forms-capable web browser client. By applying the procedure and the criteria used in this study, librarians and users who participated in such a collaborative system could construct and use the health information resources collaboratively.

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