

# The public's need for dentistry information on the Internet and its current status in Taiwan

YUNG-YEN CHIANG<sup>1</sup> DUEN-KAI SHIAU<sup>1</sup> SHU-LI WANG<sup>1</sup> SHUN-TE HUANG<sup>2,3,4</sup>

<sup>1</sup> Department of Dental Laboratory Technology, Central Taiwan University of Science and Technology, Taichung, Taiwan, ROC.

<sup>2</sup> Graduate Institute of Oral Health Sciences, Kaohsiung Medical University, Kaohsiung, Taiwan, ROC.

<sup>3</sup> Department of Dental Hygiene, Kaohsiung Medical University, Kaohsiung, Taiwan, ROC.

<sup>4</sup> Department of Pediatric Dentistry, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan, ROC.

Due to increasing awareness of oral hygiene, many dentistry websites have been established in recent years. However, many Internet users cannot find helpful information online, nor do these users frequently visit such websites. The purposes of this study were to investigate the usefulness of dentistry websites for meeting the public's needs, to examine the current status of dentistry information on the Internet in Taiwan, to explore the influences of dentistry websites on the attitudes of dental patients, and to analyze factors that may influence the use rate of page viewers. Based on the analyzed information from dentistry websites and the results of questionnaires on Internet usage, we found that most dentistry websites only provide general information on clinics and the backgrounds of their dentists. However, the public is interested in such information as the costs of materials and treatment procedures which is not currently provided by many dentistry websites. The results of this research also showed that in general, most people do not browse through dentistry websites for dental information, and for those who do, viewers are mainly aged 30~40 years. Among the selected samples, 24% wished to obtain related clinical information before seeking medical advice for treatment of oral diseases. Furthermore, about 71% of the people interviewed believed that ideal dentistry websites that met the public's needs were essential. Therefore, we suggest that the dental profession should put more efforts into establishing ideal dentistry websites that meet the public's demands for information in Taiwan. At present, there is still a long way to go to achieve this goal. (*J Dent Sci*, 2(1) : 30-38, 2007)

**Key words:** Internet, dentistry website, public needs.

Due to increasing awareness of oral hygiene, many dentistry websites have been established in recent years. Despite the proliferation of such websites, many Internet users cannot find helpful information online, nor do these users frequently visit these websites. It is important to ascertain what dental information will satisfy Internet users and to increase traffic on these websites. In this study, we investigated the public's needs for dentistry websites

and focused on the fundamental features for establishing a dentistry website that meets the public's demands. This research also proposes a model for dentistry websites based on simulated users' needs as a reference for dental clinics when setting up their own websites.

## MATERIALS AND METHODS

### Investigation of clinical websites

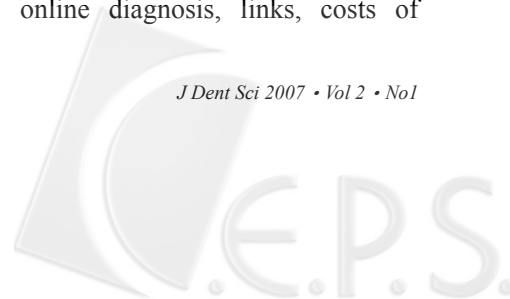
First, in order to help us understand the current contents of dentistry websites, we divided the content of clinical websites into 12 items, including introduction to the clinic, dentist's background, lecture, introduction to disease, what's new, questions and answers (Q&A), online diagnosis, links, costs of

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Reprint requests to: Dr. Yung-Yen Chiang, Department of Dental Laboratory Technology, Central Taiwan University of Science and Technology, 11 Buzih Lane, Beitun District, Taichung, Taiwan 40601, ROC.



materials, fabrication processes, chat room, and others. This study randomly selected 100 clinical websites among the total population of 5730 dental clinics in Taiwan (Year 2003 Statistics of the Department of Health, Executive Yuan) and investigated the first 11 items on these websites. The number of websites which contained each item divided by the total number of websites was the percentage rate of an item. This percentage was then used to analyze the characteristics of the dentistry website and its related ratio for each item, as well as providing a basis for advanced statistical analysis in order to present current trends in dentistry websites.

### Questionnaire survey

We used the following questionnaire to examine the opinions, usage rates, and demands for clinical websites among 800 people. The sample population was randomly selected from local districts of the National Health Insurance of Taiwan: 300 samples from the northern district, 200 samples from the central district, 200 samples from the southern district, and 100 samples from the eastern district.

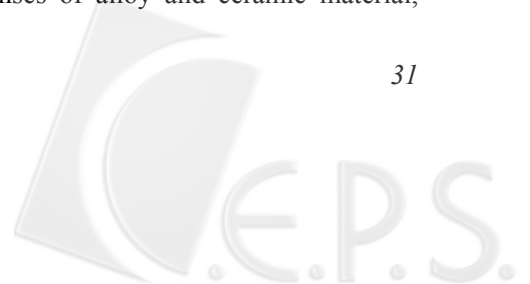
1. What is your (interviewee's) age? (This question was used to differentiate the various demands of different age groups. Interviewees were divided into age groups of 10 years, e.g., aged 20~29, 30~39, and 40~49. All the interviewees younger than 20 years were grouped together, and all the interviewees older than 50 years were grouped together. The number of subjects in each age group was about the same.)
2. Have you ever visited a dental-related websites? (This question was to determine whether the interviewees visit website for dental-related information and the usage rates.)
3. Where do you obtain dental information when you need it? (This question was to determine to what extent the interviewees use dentistry websites.)
4. What do you do when you have a dental problem? (This question was to understand the desire to gather related information before seeking medical attention.)
5. How do you choose a dental clinic? (This question was to determine if a website's structure influences interviewees' choices.)
6. What kind of information would you like to have before seeking medical advice? (This question asked the interviewee to choose from the 12 provided items on a dental clinic website.)

7. Which subject matter do you consider the most important? (This question was to determine the most important items from a dental clinic website.)
8. Is it necessary to create a dental clinic website based on the demands mentioned above? (This question was to determine the necessity of setting up a dentistry website.)
9. In your opinion, what are the advantages in gathering dental information through the Internet? (This question was to determine what kind of information provided by dental clinic websites attracts Internet users.)

To calculate the percentage of each item, we added the number of the same items that appeared in the answers and then divided this sum by the total sample population. The percentage was the statistical ratio of each item. The confidence interval  $P \pm Z_{\alpha/2}(q \wedge p \wedge n)^{1/2}$  was calculated by integrating the sample information of clinical websites and data obtained from the questionnaire as well as the chart.

## RESULTS

The content of "introduction to the clinic" (found on 78% of sites examined) includes mostly an introduction to the instruments and equipment of a clinic, the external environment and space, as well as the services provided by the clinic as shown in Table 1. The "dentist's background information" (70%) consists of the academic background, professional experience, and specialties of the dentists working at the clinic. The Q&A (42%) provides dentists' answers to frequently asked questions by patients. The "introduction to disease" (39%) provides general information on dental diseases). "What's new" (35%) is the area which introduces the latest dental treatments, materials, inventions, etc. The "message board" (32%) is where patients can post their questions and share their experiences. "Others" (19%) includes a place for patients to schedule outpatient appointments, download films and songs, and obtain a service statement. The "links" (14%) item offers links to other related websites. "Lecture" (10%) is where dentists present their research reports and professional opinions. "Manufacturing process" (9%) introduces various restoration processes. "Online diagnosis" (4%) is where one can obtain an initial understanding and diagnosis before seeking medical advice. "Costs of materials" (0%) is the area where expenses of alloy and ceramic material,



**Table 1. Percentage of websites containing content on a certain subject**

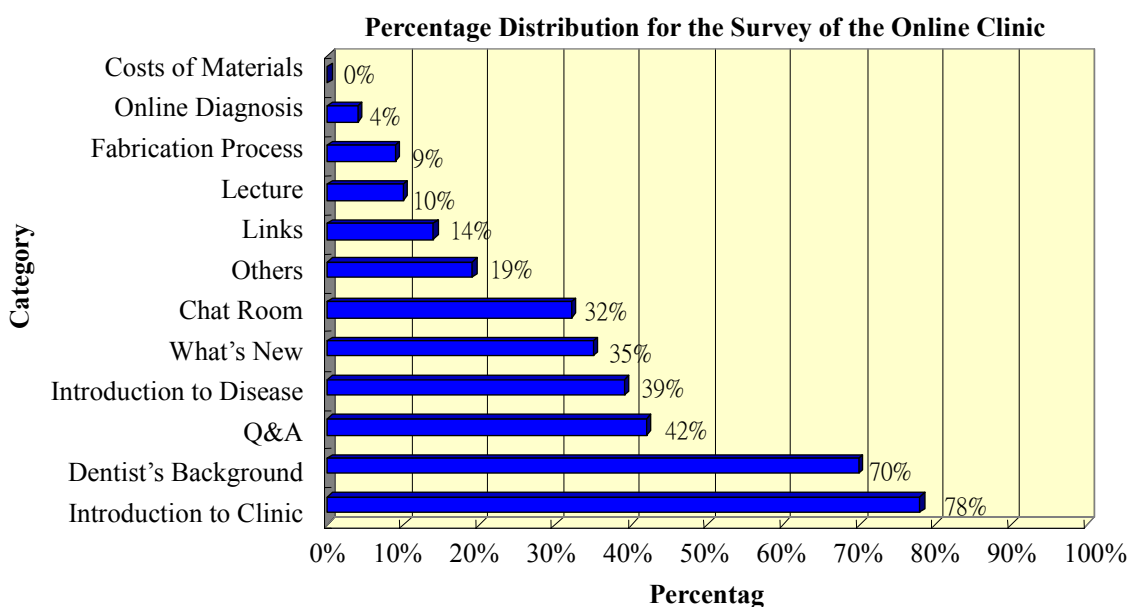
Subject	Number of websites*	Percentage of websites	CI value
Introduction to the clinic	78	78 %	0.78 ± 0.08
Dentist's background	70	70 %	0.70 ± 0.09
Questions and answers	42	42 %	0.42 ± 0.10
Introduction to disease	39	39 %	0.39 ± 0.10
What's new	35	35 %	0.35 ± 0.09
Chat room	32	32 %	0.32 ± 0.09
Others	19	19 %	0.19 ± 0.08
Links	14	14 %	0.14 ± 0.07
Lecture	10	10 %	0.10 ± 0.06
Fabrication processes	9	9 %	0.09 ± 0.06
Online diagnosis	4	4 %	0.04 ± 0.04
Costs of materials	0	0 %	0 ± 0.00

\*From a sample of 100 clinical websites among a total of 5730 dental clinics in Taiwan (Year 2003 statistics of the Department of Health, Executive Yuan). The percentage of websites is the percentage of the quantity of subject matter and sampled websites. CI value, 95% confidence interval.

treatments, and surgeries for installing various restorations are listed. Figure 1 gives the different percentages divided by subjects.

The results of the questionnaire (Table 2) show the percentages of individual items requested by the

public. Information most wanted by the public was a dentist's background information, i.e., the professional specialty of the dentist (59%). The price of materials (50%) was the second most important category, which includes the various surgical and material expenses



**Figure 1.** Current trend of online content from a survey of online clinics.



**Table 2. Percentage of the public desiring a certain subject on dental websites**

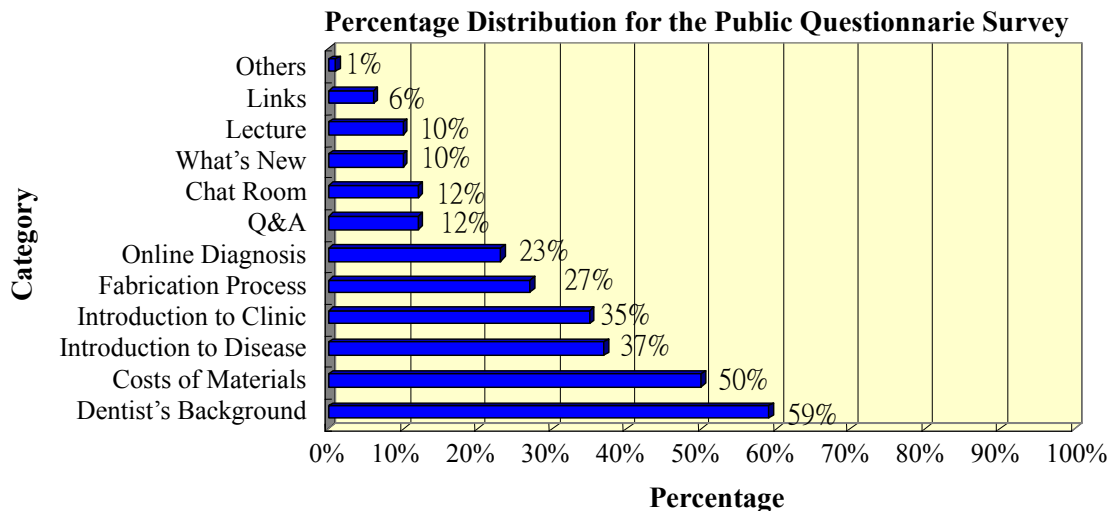
Category	Quantity	Percentage of questionnaire	CI value
Dentist's background	373	59 %	0.59 ± 0.04
Costs of materials	320	50 %	0.50 ± 0.04
Introduction to disease	238	37 %	0.37 ± 0.04
Introduction to the clinic	224	35 %	0.35 ± 0.04
Fabrication processes	174	27 %	0.27 ± 0.03
Online diagnosis	151	23 %	0.23 ± 0.03
Questions and answers	81	12 %	0.12 ± 0.02
Chat room	79	12 %	0.12 ± 0.02
What's new	67	10 %	0.10 ± 0.02
Lecture	66	10 %	0.10 ± 0.02
Links	42	6 %	0.06 ± 0.02
Others	9	1 %	0.01 ± 0.01

\* The number of total responses was 800; the number of valid responses was 638; the percentage of questionnaire was the percentage of quantity of subject matter and valid responses; the CI value is the 95% confidence interval.

not covered by National Health Insurance program. However, the “clinic introduction”, which ranked highest in percentage among the items provided, was required by merely 35% of the public. The results of the questionnaire survey showed that the public still does not commonly visit dentistry websites. The low visitation rate is probably due to the meager and dull contents of such websites, as well as the public's

neglect of dental care. People usually do not seek medical advice until they are ill. They have no other choice but to follow a dentist's instructions due to a lack of information and resources. Figure 2 gives the percentages of the items in the Public Questionnaire Survey.

In integrating the results of the Clinical Website Investigation (Table 1) and the Public Questionnaire



**Figure 2.** Trend of the public's needs based on a public questionnaire survey.



**Table 3. Page view frequency of dentist websites by the public, by age group**

Frequency	Age (years)					Total
	< 20	20~30	30~40	40~50	> 50	
Never	9.33 %	8.07 %	2.22 %	14.62 %	13.75 %	47.99 %
Viewing when needed	8.44 %	7.72 %	12.59 %	2.31 %	2.50 %	33.56 %
Viewing seldom	1.33 %	3.51 %	2.96 %	1.54 %	0.63 %	9.97 %
Viewing sometimes	0.33 %	0.53 %	1.48 %	0.96 %	1.88 %	5.18 %
Viewing frequently	0.56 %	0.18 %	0.74 %	0.58 %	1.25 %	3.30 %

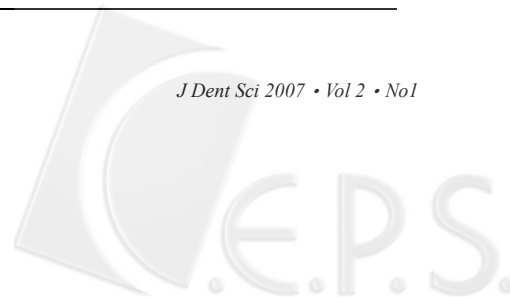
Survey (Table 2), the most prevalent website items, which are often consulted and compared by the public while selecting a clinic, were “clinic introduction” (78% in the Clinical Website Investigation and 35% in the Public Questionnaire Survey) and “dentist background information” (70% in the Clinical Website Investigation and 59% in the Public Questionnaire Survey). The oral health and disease prevention information presented in the “disease introduction” (39% in the Clinical Website Investigation and 59% in the Public Questionnaire Survey) is good educational sources for the public. The largest difference was the “material costs” item with 0% on the Clinical Website Investigation and 50% on the Public Questionnaire Survey. Many people tended to select medical treatment according to their own medical conditions and the total medical expenses. The “fabrication process” (9% in the Clinical Website Investigation and 27% in the Public Questionnaire Survey) introduces the process of diagnosis and restoration to the public. The “online diagnosis” item (4% in the Clinical Website Investigation and 23% in the Public Questionnaire Survey) helps the public understand the diagnosis for their conditions. The “Q&A” item (42% in the Clinical Website Investigation and 12% in the

Public Questionnaire Survey) is a common approach for building interactions between patients and dentists, and includes common questions and dentists’ responses. The remaining items had low percentages. We do not discuss them further. It is recommended to create the 6 basic items based on the previous organization: dentist background information, clinic introduction, disease introduction, material costs, fabrication process, and online diagnosis when setting up a good dental clinic website. Other items can also be considered for setting up the website in order to resolve the many questions of patients.

As for the rate of page views of dental websites, according to the results of the Public Questionnaire Survey (Table 3), 48% of people never viewed any dental websites. Other people viewed dentistry websites (52%) under several circumstances, such as viewing when needed, rarely, sometimes, and frequently. Among them, 11% were < 20 years old, 12% were 20~30 years old, 18% were 30~40 years old, 5% were 40~50 years old, and 6% were older than 50 years. The majority of dental website visitors were 30~40 years old. This age group may view dental sites more frequently because they have emerging dental problems, pay more attention to their health care, and

**Table 4. Approaches for acquiring dental information, by age group**

Mode	Age (years)					Total
	< 20	20~30	30~40	40~50	> 50	
Internet	6.36 %	7.50 %	5.79 %	3.30 %	0.68 %	23.62 %
Asking a medical-related department	9.55 %	7.19 %	10.74 %	9.78 %	13.56 %	50.82 %
Folk remedy	1.36 %	0.63 %	0.17 %	0.22 %	2.71 %	5.09 %
Others	0.91 %	1.56 %	0.83 %	0.11 %	0.34 %	3.75 %



**Table 5.** Methods of handling a dental problem, by age group

Mode	Age (years)					Total
	< 20	20~30	30~40	40~50	> 50	
Patent medicine or folk remedy	0.05 %	0.41 %	0.29 %	0.32 %	0.43 %	1.48 %
Acquiring the related information first	5.10 %	5.71 %	7.86 %	5.26 %	0.14 %	24.08 %
Dentist	13.92 %	11.02 %	11.43 %	11.58 %	18.57 %	66.52 %
Others	0.46 %	0.82 %	0.24 %	0.74 %	0.29 %	2.54 %

are more familiar with Internet use. As for the approaches for obtaining dental information, according to the results of the Public Questionnaire Survey (Table 4), more than 50% of people will directly ask a medical-related department to obtain the desired information, 16% will look into books, and 23% will refer to websites. The majority of people in the survey are not aware of the Internet's convenience. This result suggests that 77% do not depend on dental websites for information. According to the results of the Public Questionnaire Survey (Table 5), 24% first desire to obtain related information when they have dental problems; meanwhile, 66% will directly go and visit a dentist. Only a few paid attention to information on the Internet before seeking medical advice. As for the selection of dental clinics, the results of the Public Questionnaire Survey (Table 6) showed that 41% would go to a nearby dental clinic, 28% would go to a dental clinic recommended by their relatives or friends, 6% would choose a dental clinic based on advertisements, and 21% would choose a dental clinic according to its reputation. The information available on dental websites did not greatly influence individual choices among clinics because most people chose a nearby clinic. However, it is believed by the public that websites still act as advertisements for clinics.

As for the necessity of dental clinic websites,

according to the results of the Public Questionnaire Survey (Table 7), 5% did not consider dental clinic websites necessary, while, 71% deemed them differently (including referring to them sometimes, as being fairly necessary, and immediately necessary), and 24% thought they may or may not be necessary. Overall, establishing a website that meets the needs of the public should be valuable.

## DISCUSSION

Many industries take advantage of the ability to apply technical information to their products due to the Internet's prosperity popularity<sup>2</sup>. Traditional authoritative interrogative inquiries greatly differ from initiative medical consultations through the Internet. It is now more convenient for patients to seek a second opinion through the Internet<sup>3</sup>. The Internet provides a faster way of searching for medical information. It is even more helpful for those who can not access medical books easily<sup>4</sup>. Few websites provide information that fulfills public inquiries on pricing and procedures of treatments in advance. A good dentistry website should include dentists' background information, clinic introduction, disease introduction, costs of the materials, information of fabrication processes, and online diagnoses. Public

**Table 6.** Methods of selecting a dental clinic, by age group

Mode	Age (year)					Total
	< 20	20~30	30~40	40~50	> 50	
Recommended by relatives or friends	6.05 %	5.52 %	5.38 %	5.43 %	5.33 %	27.71 %
Advertisement	0.93 %	1.11 %	1.54 %	2.86 %	0.27 %	6.70 %
Reputation	2.79 %	2.22 %	4.62 %	5.05 %	6.67 %	21.34 %
Others	0.00 %	0.04 %	0.15 %	0.95 %	0.67 %	1.81 %





**Table 7. Necessity of dental clinic websites, by age group**

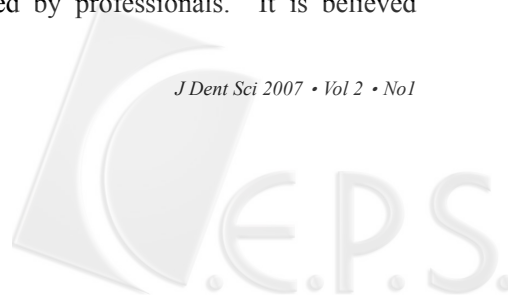
Necessity	Age (years)					Total
	< 20	20~30	30~40	40~50	> 50	
May or may not be necessary	4.19 %	3.83 %	0.76 %	6.67 %	8.53 %	23.98 %
Referring to it sometimes	9.67 %	10.64 %	13.33 %	6.33 %	5.33 %	45.31 %
Somewhat necessary	4.65 %	5.11 %	4.76 %	5.56 %	2.67 %	22.74 %
Immediately necessary	0.09 %	0.26 %	0.95 %	0.33 %	0.80 %	2.43 %

health information can be divided into healthcare knowledge, medial knowledge<sup>5</sup>, and any health information related to the public and their families<sup>6</sup>. Providing information on costs, outcomes of medical treatments, and guidelines on specific medical treatments helps patients make decisions before undergoing medical treatments<sup>7</sup>. However, such market information is insufficient in Taiwan. Most people rely on personal connections from their dentists to obtain medical information. That is why the Human Rights for Medical Treatment Promotion Association, R.O.C. provides services that enable the public to inquire about a doctor's background on its website so that they can make informed decisions<sup>8</sup>. Based on research and studies<sup>9</sup>, 43% and 52% of patients in Taiwan never inquire about information on hospitals or doctors through the Internet. One of the advantages of using the Internet is to find the desired answers without actually seeing a doctor. This simple operation can easily be carried out at home, which saves a lot of time<sup>10</sup>. The key to a good dentistry website is to have a user-friendly web page and a comprehensive contents section, and to be easy to operate navigate<sup>10</sup>. The results of our analysis show that the percentage of the public who view medical websites is very high between the ages of 30 and 40 years comparing to those under 30 years old. This may be due to the fact that younger people have fewer incidences of disease. Reasons for seldom or occasionally visiting medical websites are that 54% had fewer demands and 23.1% could not find the required information<sup>11</sup>. It is evident that the contents on current medical websites and interfaces need to be further improved. The study also showed that 23.1% of the people thought that the content of professional knowledge needs to be enhanced in Chinese language versions<sup>11</sup>, disease consultation, updating speed, and information credibility. Overall, most dental clinic websites do provide general professional knowledge;

therefore, [browsing through dentistry websites will prevent roguery incorrect information should not become prevalent. Many people are deceived simply because they lack general medical knowledge<sup>12,13</sup>. Most dentistry websites do not state clinical fees, which is a serious problem because most patients worry about treatment costs<sup>10</sup>. They might not feel secure until they clearly understand the clinical charges. Providing clinical fees also helps advertise. Patients can acquire information from a website and interact with dentists<sup>14</sup>. These interactions can bring vitality to the websites. A successful website supports both dentists and the public<sup>15</sup>. Website maintenance and updates are critical tasks for website owners. Many dentistry websites end up being abandoned due to a failure to provide updates. It is necessary to appoint someone to be in charge of updating a website<sup>16</sup>. Furthermore, the accuracy of the website information should be monitored by the Dental Association to avoid any serious consequences caused by delays in replying or incorrect medical information<sup>17</sup>.

An initial online diagnosis can provide disease diagnosis and treatment suggestions for a patient's reference. If patients can present their problems through online services before seeing their dentists, diagnosis time will be shortened, choices of treatment can be evaluated beforehand, and patients' time will be saved as well.

The 21<sup>st</sup> century looks to be an era of knowledge exchange through the Internet. Interactions (including synchronization and asynchronization) are a very important function in e-learning that provides appropriate feedbacks. Failure to provide timely feedback makes e-learners feel impatient and anxious<sup>18</sup>. Chat rooms, message boards, and Q&A are good approaches for supporting interactions between patients and dentists. Websites can also be mutually corrected by professionals. It is believed



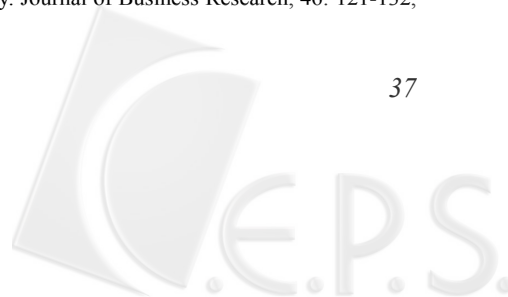
that this kind of interaction is the trend of the future. After learning how to search for medical knowledge, patients can compare the professional knowledge of dentists and then seek an appropriate dentist for advice. If patients desire to participate, they can give useful information to the dentists in return. This way, dentists can provide more-adequate information to meet their patients' needs after mutual communication and understanding<sup>19</sup>. This improves the quality of services recognized by the patients on the 1 hand<sup>20</sup> and reduces dentists' costs of searching for and testing the best treatments on the other hand<sup>21</sup>. The Sholar Cermask discovered that raising users' participation can increase user satisfaction as well<sup>22</sup>. Although obtaining information from the Internet is fast and convenient, it still cannot replace general medical practice. Nevertheless, the Internet can be a very appropriate channel for providing medical information in the future<sup>23,24</sup>.

In conclusion, introduction to a clinic and dentist background information are the 2 most important items according to the results of both the public questionnaire survey and the clinical website investigation. Information on material costs and fabrication processes provided by websites do not currently meet the public's requirements. The majority of dental website visitors are between 30 and 40 years old. This is probably because the people of this age group have emerging dental problems and pay more attention to dental care than do younger people. In addition, they are more familiar with the Internet than people older than 40 years. They may frequently visit dental websites to seek information. Rather than viewing a website, most people will ask a medical-related department when seeking dental information. This may be because dental websites are not yet prevalent. People cannot find the information they need on dental websites. Reply delays or high error rates by dental websites may be other reasons. Most people directly go to see a dentist when a dental problem arises. This is probably because of weak concepts of health care and the unpopularity of dental clinic websites. People do not pay attention to such websites. The public usually prefers clinics near their home or work. It is believed that the public will understand the convenience of the online interaction of clinical websites after clinical websites become more popular in the future. When the public thinks that good clinical websites have practical value, such websites will be

in greater demand in the future.

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