ESTABLISHMENT AND EVALUATION OF THE JAPANESE EDITION OF THE WEEKLY EPIDEMIOLOGICAL RECORD (WER) WEBSITE BY THE FACULTY OF HEALTH SCIENCES OF KOBE UNIVERSITY SCHOOL OF MEDICINE

Hiroko Sakaguchi[1,2], Makoto Usami[1], Hiroshi Ando[1] and Atsushi Ohata[1]

[1]Faculty of Health Sciences, Kobe University School of Medicine, Kobe;
[2]Kansai Airport Quarantine Station, Japan

Abstract. To report on the establishment of the Japanese version website of the Weekly Epidemiological Record (WER) by the faculty and to evaluate its accessibility and the educational outcome: all articles from the WER since 2000 have been translated into Japanese by graduate students with teachers' guidance, verified by the committee members, and delivered to the website. The server log files and retrieval keywords were analyzed using Analog 6.0. An on-line questionnaire survey of visitors to the website was performed. Opinion sheets reported by the students for translation were evaluated as the educational outcome. Over 6 years, there were 820,571 requests to the website and, the number of requests increased with disease outbreaks. According to domain analysis, most requests were during daytime on weekdays, and the website was utilized by users in educational institutions and the Japanese government and by overseas visitors. Among respondents to the questionnaire, 47% were laypersons and 69% found the website easy to understand. SARS and HIV/AIDS were the terms most frequently used for retrieval. The students recognized the importance of the World Health Organization (WHO) and had broadened their perspective on international health. The website is useful for Japanese. The translating process was effective for international health education.

INTRODUCTION

The World Health Organization (WHO) provides the Weekly Epidemiological Record (WER) as an essential instrument for the rapid and accurate dissemination of epidemiological information on cases and outbreaks of diseases under the International Health Regulations. It also reports other communicable diseases of public health importance, including emerging or re-emerging infections (Weekly Epidemiological Record http://www.who.int/wer/en). The WER is provided in English and French, but this original version is difficult for Japanese laypersons to understand, preventing them obtaining the latest important information on epidemiology. The provision of up-to-date information on infectious diseases is common worldwide but rare in Japan, largely because such diseases are uncommon in this country due to the highly developed public health system. Topics focusing on Japan are rare in the WER. For example, only one outbreak news item, concerning staphylococcal food poisoning, was reported in 2000.

Ninety percent of non-Japanese who visited a travel clinic in Kathmandu had been vaccinated against hepatitis A and typhoid, whereas 95% of the Japanese who visited the clinic had not been vaccinated against these diseases (Basnyat *et al,* 2000). Typhoid vaccine is not licensed by the authorities in Ja-

Correspondence: Makoto Usami, Faculty of Health Sciences, Kobe University School of Medicine, 7-10-2 Tomogaoka, Suma-ku, Kobe 654-0142, Japan.
Tel: +81-78-796-4591; Fax: +81-78-796-4509
E-mail: musa@kobe-u.ac.jp

pan, whereas hepatitis A vaccine is authorized for use and vaccinated in many medical clinics. It is 36 years since the last outbreak of rabies in Japan, and little concern is now shown regarding this infection. In 2006, for example, two Japanese men developed rabies following dog bites in the Philippines and died after returning to Japan (ProMed-mail, 2006). Since the reporting of such cases, however, inoculation against rabies has increased rapidly. Japanese may avoid and prevent various infectious diseases if they have sufficient knowledge of worldwide epidemiology and outbreak information. According to the Immigration Bureau of Japan, 17,403,565 people left for another country in 2005. Returning Japanese tourists and foreigners have to pass through the Quarantine Stations in Japan on arrival. Quarantine Stations undertake screening examinations at airports and ports by means of self-assessment questionnaires and measuring body temperature, to screen for serious infectious diseases such as viral hemorrhagic fever and avian influenza. Anyone suspected of having viral hemorrhagic fever at a Quarantine Station is sent to hospital for further examination and treatment (Iwasaki, 2005). Diarrhea is the most common illness in travelers, affecting 10-60% of those who visit developing regions (Kotton *et al,* 2005). However, very few people (as low as 0.25% at Kansai Airport Quarantine Station) report this symptom. Japanese travelers must become aware of the risk of infection overseas and report any symptoms to the Quarantine Stations. Epidemics may then be prevented at the border.

To provide information and international health education to graduate school students of our faculty, we translated the WER and update the website under the Information Center for Infectious Disease and Epidemiology (ICID) at the Faculty of Health Science, Kobe University School of Medicine. The translation rights were obtained from the Director General of the WHO on August 12, 1999, for a website in Japanese, which is solely responsible for the Japanese edition, because Japanese is not the official language of WHO. We have been summarizing the WER to about one-half to one-third of the original length, translating it into Japanese, and delivering it to the website each week since 2000. The process is part of the curriculum for all master's course graduate school students in Kobe University Graduate School of Health Science.

In this study, we report on the system used to prepare the WER Japanese version. We then analyze users' interests and background based on log file data, keywords used in the search engine, and a questionnaire survey. Finally, the educational outcome is evaluated using comments from graduate school students who translated the WER.

METERIALS AND METHODS

Preparation of the WER Japanese version at Kobe University

The 58 master's course graduate school students in 2005 were comprised of the following: 12 students in the Department of Nursing, 11 in the Department of Applied Medical Technology, and 35 in the Department of Physical Therapy and Occupational Therapy. Students are in charge of the translation as part of the education curriculum for the master's course, and over 50 faculty members, including professors, assistant professors, and lecturers, supervise the students once a year. The WER staff at the faculty who specialize in this work lays out the text with a figure or table and hands the paper to the ICID committee member. The committee members' specialties are parasitology (S Uga), virology (E Konish), bacteriology (K Kataoka), international health research (N Nakazono, Y Tamura, and N Hohashi), computer science (H Ando and E Masai), and clinical medicine (Y Ishikawa, T Kawamata, T Takada, and M Usami).

The process is as follows. First, the staff member sends an original article from the WER, which is updated on the WHO website every Friday, and a written request to the in-charge student, supervisor, and committee member, with an opinion sheet. Second, the graduate student translates the article into Japanese under the guidance of his or her supervisor. The staff member then proofreads it. There are various reference materials available in the faculty library, including textbooks of infectious disease, atlases, and information on international cooperation and public health. If there is no suitable term in Japanese, the English word is translated into an equivalent Japanese term by the ICID committee, and these terms (currently 471) are included in our updated ICID dictionary supplied to in-charge persons. Finally, the ICID committee members ensure that the article is free of mistakes and the final version is converted into a portable data file (PDF) and uploaded onto the website with the in-charge person's name. The whole process takes about 4 weeks. The PDF files are arranged in reverse chronological order on the website, with links to the WER original versions for reference.

By December 31, 2005, 375 files had been uploaded. We have adopted NAMAZU (which means catfish in Japanese), a full-text search engine developed for Japanese, for locating PDF articles on the website (NAMAZU Project, http://www.namazu.org/index.html.en).

Analysis of web log files

The web server log file collects data records about access requests to the website. Each record contains the following fields: the visitor node (IP address) where the request was issued from, the date and time (web server local time) when the request was issued, the type of request, the web page requested, the returned status, and the number of bytes of content transferred to the visitor's web client (Rozic-Hristovski *et al,* 2002). The log files of use of NAMAZU with retrieval keywords were also collected. Access log files collected from January, 2000 to December, 2005 (2,187 days), were used. The files were analyzed using the popular log file analysis software Analog 6.0 (Turner S, http://www.analog.cx/).

The analysis period was divided into three terms to evaluate the impact of severe acute respiratory syndrome (SARS) on access to the website. The period from May 15, 2003 to July 5, 2003 was defined to encompass the SARS outbreak, following the WHO's naming of the new disease as SARS and its declaration that the SARS outbreak had been contained worldwide. For the analysis, there were thus 1,164 days before SARS, 113 days during SARS, and 910 days after SARS.

On-line questionnaire survey

An on-line questionnaire survey was conducted among visitors to the WER Japanese version website to evaluate the usefulness of the site to users. The questionnaire was comprised of 17 questions. The duration of the survey was 125 days from August 8 to December 10, 2005.

Evaluation of educational outcome

The educational outcome for the graduate students was evaluated by means of the opinion sheets that were returned from the students in charge of translation.

RESULTS

Analysis of log files

The WER Japanese version website has been online since January 2000, and by December 31, 2006 had received a total of 820,571 requests. It is now linked to a number of important websites, including those of the National Diet Library (http://www.ndl.go.jp/en/index.html), the National Institute of Infectious Diseases (http://www.nih.go.jp/niid/index-e.html), the Quarantine Stations of Kansai Airport (http://www.forth.go.jp/keneki/kanku/),

Kobe (http://www.kobe-keneki.go.jp/ top.html), and Naha in Okinawa (http://www1.odn.ne.jp/aao42060/), and many universities. The topics in the WER Japanese version are listed in a biweekly bulletin from the Hyogo Prefecture Medical Association.

The total number of server requests was 2,353 during January, 2000. When the SARS outbreak began in April, 2003, the number of requests reached 50,196. The average number of requests per day was 1,368 during the SARS outbreak, whereas it was 273 before and 381 after the outbreak. The monthly percentages of the total requests in each year are shown in chronological order in Fig 1. These data were compared with the dates of outbreaks reported in the WHO outbreak news. A close correlation between months with a higher percentage of the year's total requests and outbreak news events was indicated.

Over the 6-year period, the average number of server requests on any given weekday was about 120,000 (Fig 2). On weekends, the number was about 75,000. This pattern persisted despite the SARS outbreak. Two time blocks during weekdays were of particular interest over the 6 years: noon to 3:00 PM, and 3:00 PM to 6:00 PM. Together, these blocks accounted for more than 20% of all weekday requests. On weekends, the most active time was 9:00 PM to midnight, which accounted for 19% of all weekend requests.

The sources of access were analyzed by means of the log files (excluding 242,961 for which the IP address could not be analyzed). Visitors from the .jp domain, which is a top-level domain, accounted for 81% (464,974) of all requests. The details of the .jp domain are shown in Fig 3, with an explanation of the abbreviations used in the second-level domains. Over one-half of requests were from ne.jp, followed by 19% from ac.jp; 40% of those from ac.jp were from the Faculty of Health Science of Kobe University School of

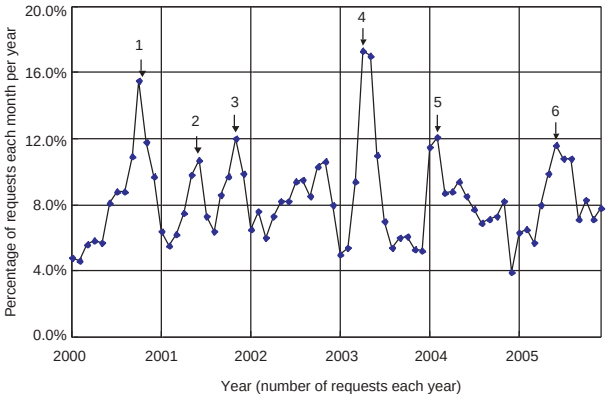
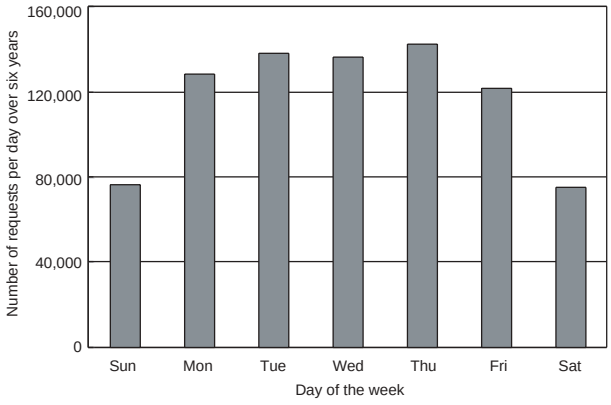


Fig 1–Percentage of total request numbers in each month per year over 6 years. There were 820,571 requests during the years 2000 to 2006; 49,178 in 2000, 83,584 in 2001, 147,814 in 2002, 290,295 in 2003, 182,507 in 2004, and 67,193 in 2005. Monthly request numbers are expressed as percentages of the total number in that year. Marked peaks were related to pandemic events, as follows: ebola hemorrhagic fever was prevalent in Uganda in October, 2000 (1). The event resulted in 15.5% of the year's requests. The following peaks corresponded with the outbreak of Crimean-Congo hemorrhagic fever in Kosovo in January, 2001 (2), anthrax cases in the USA in November, 2001 (3), severe acute respiratory syndrome (SARS) globally in April, 2003 (4), avian influenza in humans and poultry in Vietnam in February, 2004 (5), and poliomyelitis in Indonesia in January, 2005 (6).



Fi 2–Request numbers by day of the week over 6 years.

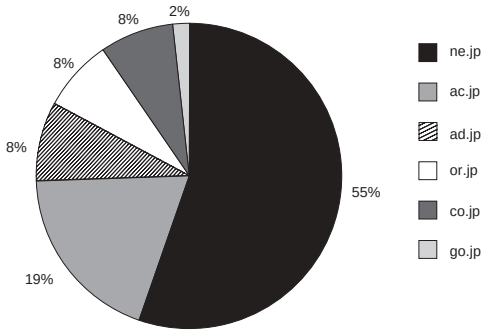


Fig 3–Percentage of request numbers from main second-level domains with .jp as the country code top-level domain. These are ne.jp (network service providers), ac.jp (higher-level academic institutions such as universities), ad.jp (Japan Network Information Center member), or.jp (registered organizations and non-profit organizations), co.jp (most forms of incorporated companies), go.jp (Japanese government ministries and their endeavors).

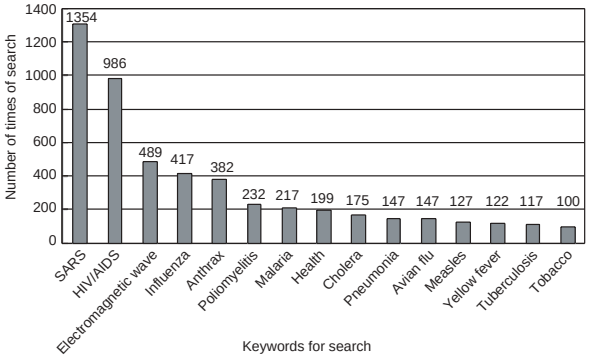


Fig 4–Major keywords and their request numbers used over 6 years in the NAMAZU informational search engine.

Medicine. Eight percent were from ad.jp, followed by or.jp (8%), co.jp (8%), and go.jp (2%). Eighteen percent (105,292) of all analyzable requests were from the commercial organization (.com) or network management infrastructure (.net) domains, and the remaining requests were from overseas. Requests from countries outside Japan came most commonly from the USA (2,899, 43% of all overseas requests). Among requests from the USA, 987 (34%) were from educational institutions. After the USA, the country accounting for the highest percentage of overseas requests was Taiwan (5.5%), followed by Australia (5.3%), Singapore (5.1%), and the UK (4.6%). Users in Canada, France, Thailand, and various other countries also accessed the website (Table 1).

Table 1
Number of accesses from a computer with the country code top-level domains listed, over a 6-year period. (Countries with more than 100 requests are shown).

Country code top-level domain (ccTLD)	Number of requests
.edu, .org, .arpa, .mil, .gov, .us, .coop (probably USA) except .com, .net, .jp and another ccTLD	2,899
.tw (Taiwan)	371
.au (Australia)	359
.sg (Singapore)	345
.uk (United Kingdom)	313
.ca (Canada)	237
.fr (France)	203
.th (Thailand)	197
.dk (Denmark)	176
.nl (Netherlands)	171
.de (Germany)	159
.ch (Switzerland)	139

Retrieval keywords in the search engine NAMAZU

Over the 6-year period, the keyword accounting for the most requests was SARS with 1,354, followed by HIV/AIDS with 986 (Fig 4). Before the SARS outbreak, among retrieval keywords that were requested more than 100 times, HIV/AIDS was the most frequently requested (343 times), followed by electromagnetic wave (184), anthrax (145), and influenza (134). During the SARS outbreak, the keyword

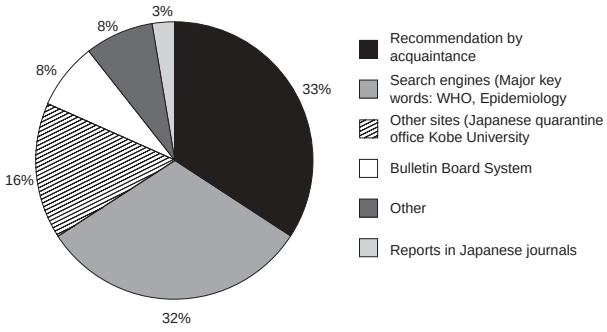


Fig 5–Percentage of referrals to our site among respondents to questionnaire (n=38).

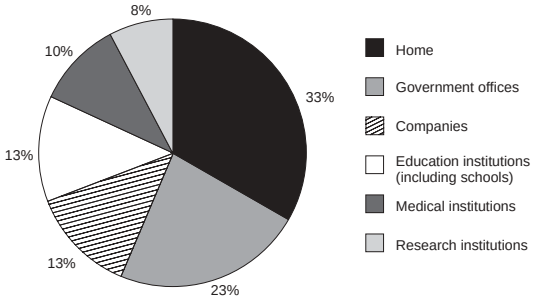


Fig 6–Percentage of requests to accessing locations among respondents to questionnaire (n=39).

SARS/severe acute respiratory syndrome accounted for 1,146 requests. Pneumonia was second during the SARS outbreak with 142, followed by yellow fever with 107. After the SARS outbreak, HIV/AIDS was the most popular keyword with 481 requests, followed by influenza (227), electromagnetic wave (219), anthrax (218), SARS (200), avian influenza (147), and poliomyelitis (118). The keyword electromagnetic wave was frequently retrieved by NAMAZU, though there were no files on this topic on the website.

On-line questionnaire survey

There were 22,684 requests while the questionnaire was on the website. Of the requests during that period, 183 visited the questionnaire page and 41 persons answered all or part of the questionnaire. Twenty respondents were first-time visitors and 21 were repeat visitors. The number of respondents was small, but valuable for evaluating the users' opinions and background.

Thirty-two percent of respondents found our website through an internet search engine. Sixteen percent were referred by an internet link, while in 33% the website was recommended by an acquaintance (Fig 5).

Fifty-nine percent of all respondents and 75% of repeat visitors said that they would recommend the website to an acquaintance. Thirty-three percent of repeat visitors had used the website for more than 3 years. Thirty-three percent of respondents accessed from home, followed by access from a government office, a company, an educational institution, a medical institution, and a research institution (Fig 6).

Thirty-three percent of the users of the website were under 30 years of age, 54% were 30-49 years, and 13% were 50-59 years. Among those who reported being under 30 years old, 38% were high school students, 38% were university or graduate school students and the other 24% included health consultants and office workers. Fifty-three percent of respondents had a medical qualification or were studying for one, including medical doctor, nurse, public health nurse, pharmacist, medical technologist, dietician, and medical engineer; 47% did not have any medical qualifications. Respondents not belonging to the medical field included housewives, staff of agricultural associations, and public officers with no medical qualifications.

Among first-time visitors, the most frequent visitors were high school students under the age of 20 years who referred to the website while writing a report (42% of first-time visitors). Sixty-six percent of repeat visitors used the website to obtain world epidemiological information for a lecture or presentation, or for their studies (Fig 7). They were

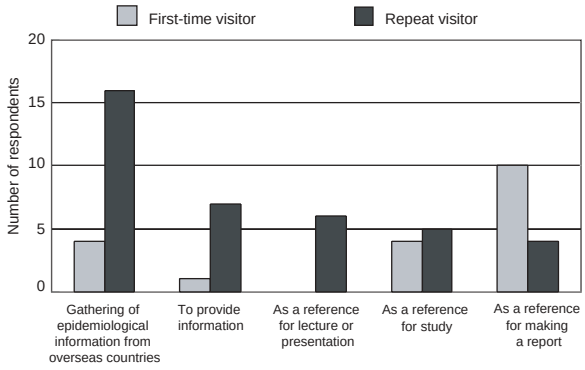


Fig 7–Purposes of visiting the website among respondents to questionnaire.

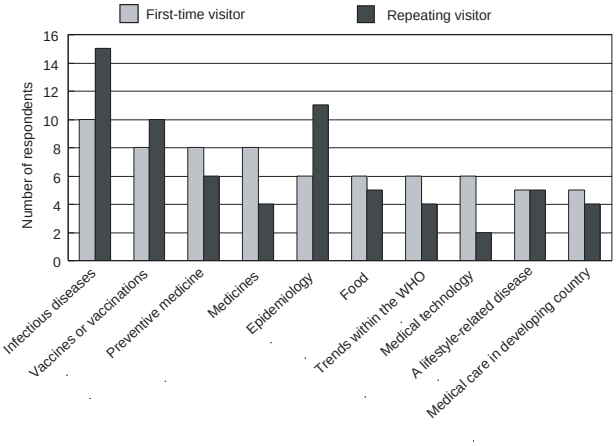


Fig 8–Concerns of the respondents.

Keywords answered by more than five respondents to the questionnaire. The respondents could check all applicable answers.

interested in infectious disease, vaccines and vaccination, epidemiology, and preventive medicine (Fig 8). Seventy-six percent of respondents said the website was useful to them. No one said it was not useful. Twenty-four percent said it was neither useful nor useless. Sixty-nine percent of respondents said the contents were simple to understand and 8% said the contents were not simple. Sixty-seven percent of respondents who did not have a medical qualification said the contents were easy to understand. Forty-six percent said that the contents were accurate, while 49% said they could not evaluate the accuracy of the WER Japanese version. One person who always referred to the original WER articles said that the website's content was insufficient. Thirteen percent of respondents said they always referred to the original WER. Fifty-nine percent reported using NAMAZU; 71% of those who did not use NAMAZU said they were unaware of the existence of the system, while 21% had no need of it. The remaining 8% of the NAMAZU non-users said that they did not know how to use it. Eighty percent of NAMAZU users had found the information that they wanted.

The statements of graduate students on the opinion sheets were as follows:

Frequent access to this website made me happy and helped me brace myself for this study. I recognized the WHO's important role in resolving global problems which cannot be settled by each nation separately. Moreover, I learned about the global point of view in public health and the importance of increasing the quality of the Japanese medical care system. I learned not only about the translation of the WER into Japanese, but also about the latest news from the WHO, both of which were distinct from my specialty in medicine. From now on I will make an effort to be interested in broad fields of public health. I will pay more attention to the issue of international public health as a result of having participated in this process to prepare the WER topics in Japanese and update the university website.

DISCUSSION

Using the keywords translate or translation, language and Weekly Epidemiological Record, we searched PubMed and Medline (http://www.ncbi.nlm.nih.gov/sites/entrez?db=PubMed) for WER articles translated from

English and French into other native languages, but did not find any such articles.

This project, involving summarizing the WER, translating it into Japanese, and updating it weekly, has continued for 7 years as part of the educational curriculum of master's courses in our graduate school. We consider the website to be accepted by the Japanese community. First, there were a large number of server requests, which increased after outbreaks such as SARS. Second, many public websites link to our site. Third, over three-quarters of the respondents to the questionnaire survey were happy to recommend the website to an acquaintance, and there were many repeat visitors who had been accessing the site for more than 3 years. The increased rate of requests in accordance with disease outbreaks suggests that many visitors want appropriate and/or authorized information on infectious diseases beyond that available by mass communication.

The active times and days of the week, the domains and places of access, and the jobs of questionnaire respondents suggest that a wide variety of people use the website for work and/or private interests. One-half of the questionnaire respondents were layperson. Due to the specialized nature of the information contained in the WER, it was thought that users with no medical qualifications would find it difficult to understand. However, over half of respondents said that the contents of the website were easy to understand. Our efforts produce good results in making the information easier to understand for the layperson. However, a repeat visitor to the website said that he or she felt that the content was insufficient. Visitors to the WER Japanese version website thus have varied backgrounds, and the need for a summarized translation that is accessible to all Japanese people is confirmed.

After analysis of the log files, we found server requests from 42 other countries. We had expected that requests to the website would be from Japan only, but our findings suggest that Japanese overseas students, delegates, businessmen, technical assistants and so on, use the website. The WER Japanese version is thus a useful source of information on world epidemiology for Japanese living in non-Japanese-speaking areas.

We investigated the interests of users by analyzing the log files for retrieval keywords. These indicate that the users are interested in current topics, such as HIV, influenza and health. Users are interested not only in disease, but also in public health. Some users are interested in the WHO itself.

According to the questionnaire survey, a search engine such as NAMAZU is an important tool in searching for and analyzing information. However, the existence of NAMAZU was not well known to users. We can inform users more effectively by displaying the NAMAZU search field clearly and making it easy to access.

Evaluations based on web server log file analysis have the advantage of providing information on the overall usage of the website, but it reveals nothing about individual users (D'Alessandro *et al,* 1998). We therefore investigated users' backgrounds to clarify their needs, using a questionnaire on the website. We did not get many responses, and there are several reasons for this, including the short duration of the survey and probably asking too many questions. We have to improve future questionnaires so that they will be a long-term source of valuable information on users that will allow us to monitor the effectiveness of the website and deliver information in accordance with the users' needs.

Summarizing and translating the WER has presented some difficulties for the in-charge master's course graduate school students, who have little experience in reading primary sources in English and making abstracts.

However, learning about new fields, especially the public health role of the WHO, is a valuable experience for the students. Regarding the educational outcome, the in-charge students' outlook regarding health science has been expanded, as is seen from their statements on the opinion sheets. This curriculum allows the student participants to grow in their thinking about international health. It is true that the speed of delivery of the website content is a problem in this project, but to reduce the time to upload would be difficult. One month is necessary for the careful guidance from the students' supervisors and the special committee of various specialists that certifies the error-free delivery of the contents of the WER Japanese version. However, this elaborate process enhances the educational component of the project. Most users trust the information given in Japanese, even though its delivery is delayed by one month. Students use the information to write academic assignments and discussion sections.

We could analyze quantitative data collected from questionnaire surveys, log files, and student opinion sheets to revise the project and optimize it to better serve the needs of both users and student participants in the future. To reach the widest audience, it is important to adopt an effective strategy of information delivery over the Internet (Wilson *et al,* 2001). In this way the educational element of the project can also be evaluated by our users.

This is a significant project for students and others who want to access the information contained in the WER but speak languages other than English or French.

ACKNOWLEDGEMENTS

This project was funded by a grant from Hyogo Prefecture Health Department, Local Health Section and Hyogo Prefecture Medical Association Lifetime Education Committee for the management from 1999 to 2002, and from the Japan Society for the Promotion of Science after 2002. Thanks to the subvention that enables the maintenance and continuation of this project, and to all the faculty members for their support. I wish to thank Prof Naoki Nakazono, and Sumiko Kawata, Tomoko Okamura, Aihara Hirokuni of the WER staff.

REFERENCES

Basnyat B, Pokhrel G, Gohen Y. The Japanese need travel vaccinations. *J Travel Med* 2000; 7: 37.

D'Alessandro MP, D'Alessandro DM, Galvin JR, Erkonen WE. Evaluating overall usage of digital health science library. *Bull Med Libr Assoc* 1998; 86: 602-9.

Iwasaki E. Countermeasure against viral hemorrhagic fever at the border in Japan. *Nippon Rinsho* 2005; 63: 2154-60 (In Japanese).

Kotton CN, Ryan ET, Fishman JA. Prevention of infection in adult travelers after solid organ transplantation. *Am J Transplant* 2005; 5: 8-14.

ProMED-mail. Rabies, Human-Japan (Kanagawa) Ex Philippines 20061122.3322 22-Nov-2006 [Cited 2007 Apr 2]. Available from: URL: http://www.promedmail.org/pls/promed/f?p=2400:1202:15443340374560675659::NO.F2400_P1202_CHECK_DISPLAY,F2400_P1202_PUB_MAIL_ID:X, 35269

Rozic-Hristovski A, Hristovski D, Todorovski L. Users' information-seeking behavior on a medical library Website. *J Med Libr Assoc* 2002; 90: 210-7.

Wilson AS, Kitas GD, Llewellyn P *et al.* Provision of Internet-based rheumatology education (http://rhema.bham.ac.uk). *Rheumatology (Oxford)* 2001; 40: 645-51.