

## Portal Sites for Clinical Trial Information: Comparison of 17 Registries and Creation of a Patient-Centered New Site for the Japan Primary Registries Network

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### Abstract

**Background:** Several countries have established registries of clinical trials for intractable diseases to disseminate information. These registries are compared to glean their best features and learn from their drawbacks in order to create a patient-centered portal site for the Japan Primary Registries Network (JPRN).

**Method:** We reviewed information available through 17 registries. The contents and types of information available from these countries registries accessed via the International Clinical Trials Registry Platform were summarized and compared. The findings guided the redesign of the new JPRN portal site.

**Results:** Nearly all registry websites provide basic features. The majority of registries were created with a focus on providing information of value to registered users (i.e., medical personnel and researchers) through “FAQs” and “Help” pages. The study identified the information needs and problems related to existing registries. The study restructured the common contents of the standard registry, improving the search function, website structure, and convenience, to create a new portal site. The new portal website for patients provides reliable information on drugs and diseases, whereas that for healthcare providers provides a detailed search of clinical trials.

**Conclusion:** The new site of clinical trial information of JPRN is a patient-centered portal site widely supporting patient’s medical treatment living in order to provide information on “Commentary on diseases”, “Common medicine”, “Status of clinical trials overseas” and “Overseas medicine” for each disease in addition to “Search methods”, “Associated information on clinical trials”, and “About clinical trials”.

**Keywords:** Medical informatics; Clinical trials; Intractable diseases; Internet; Information services

### Introduction

Governments worldwide are expending considerable resources to disseminate information on intractable neurological diseases, or neurological diseases with no definite cause or method of treatment, in response to the increasing number of patients due to the global progression of aging populations. This information drive is generally covered by the variable health policy of different countries.

In Japan, public hygiene and welfare countermeasures associated with intractable and rare diseases began with the General Plan Concerning Countermeasures for Intractable Diseases in 1972, which has continuously been promoted as the world’s leading comprehensive policy encompassing scientific research, medical facilities maintenance, reduction of healthcare cost obligation, enrichment of welfare, and improvement of quality of life. As of 2014, the number of patients covered by the plan in Japan included 137,000 with Parkinson’s-related diseases, 28,000 with spinocerebellar degeneration, 22,000 with myasthenia gravis, 19,000 with multiple sclerosis, 13,000 with multiple system atrophy, and 10,000 with amyotrophic lateral sclerosis. Approximately 1.5 million people suffering from 306 different diseases were eligible for medical assistance in 2015 [1].

In the United States, the Rare Diseases Act was established in 2002 to target diseases with fewer than 200,000 patients, including metabolic disorders, intractable neurological diseases, and rare cancers [2]. The Act covers approximately 6,800 diseases, and the number of applicable patients is estimated to be 25 million people. The Act does not define “intractable diseases” as Japan’s Plan does but rather as “undiagnosed diseases.” Its measures for intractable diseases focus on investigating the causes of rare diseases as well as developing curative medicines.

In Europe, the policy of the European Union Council was made public in 2009. Europe defines a rare intractable disease as one with an incidence of less than five persons out of a 10,000 with approximately 7,000 types of diseases and an estimated 36 million patients [3-5].

Thus, the necessity for global cooperation in understanding disease pathology and developing medicines is prominent in the field of intractable diseases, where treatment and development of medicines lack advancement owing to the rarity of the conditions. Essential to the advancement of drug development and medicine in general are clinical trials. These tests are conducted primarily on humans to develop pharmaceutical products. However, to protect the rights of the participants and to optimize research, clinicians are not able to carry out clinical trials freely; an international regulation obliges them to register certain items prior to conducting clinical trials [6]. In Japan,

which has multiple registration authorities, the National Institute of Public Health has been collecting registered clinical trials since 2008 and has established a clinical trial information search system (below, portal website) to improve access to information on these trials [7]. For example, a distinction must be made between clinical trials and clinical treatment, wherein the former are borne out of cooperation from patients. Making information from these trials available helps promote clinical trials and strengthen clinical research. With a registry network, it is not enough for information to be conveyable to medical personnel; such a network must also be able to communicate pertinent information to the public in a comprehensible manner. Japan has made a mission of providing such information to the public [8]. In addition, other countries are also publicizing information in accordance with clinical trial registries [9-14].

The results of the previous study [15] revealed problems with the old portal website, such as a complicated search window, limited search function, and lack of exposure to the public. The study results also suggested that the site provide patients with information on diseases and drugs in addition to clinical trial information [16]. All registries examined had a function allowing users to search the registry data and browse the related information generated by the search; however, few websites were found to be user friendly or integrated with social media [10].

Subsequently, the Institute of Public Health carried out a redesign of the website in 2014.

## Method

We reviewed information available through 17 registries as follows: Australian New Zealand Clinical Trials Registry (ANZCTR), Brazilian Clinical Trials Registry (ReBec), Chinese Clinical Trial Registry (ChiCTR), Clinical Research Information Service (CRiS), Republic of Korea, Clinical Trials Registry India (CTRI), Cuban Public Registry of Clinical Trials (RPCEC), EU Clinical Trials Register (EU-CTR),

German Clinical Trials Register (DRKS), Iranian Registry of Clinical Trials (IRCT), ISRCTN.org, Japan Primary Registries Network (JPRN) after 2014, Thai Clinical Trials Registry (TCTR), The Netherlands National Trial Register (NTR), Pan African Clinical Trial Registry (PACTR), Sri Lanka Clinical Trials Registry (SLCTR), ClinicalTrials.gov, and International Clinical Trials Registry Platform (ICTRP). The contents and types of information available from these countries' registries accessed via the ICTRP were summarized and compared.

Then, we compared the contents and information from old and new Japanese clinical trial information websites, and described the information patients can get when "Parkinson" is searched.

## Results

### Features of all existing clinical trial information websites worldwide

The contents and types of information available from the countries' registries accessed via the ICTRP are summarized in Table 1. Nearly all of the registry websites provide basic features, such as "About the Homepage," "Contact," "How to Search," and "FAQs." The national registries of Australia, New Zealand, China, and Korea provided a "Statistics" button that would display the latest statistics of the registry. However, the majority of registries were created with a focus on providing information of value to registered users (i.e., medical personnel and researchers), with "FAQs" and "Help" features also catering to registered users on many registries. Few registries focused primarily on the "Search" functionality. Additionally, although an "Advanced Search" feature was offered in 6 registries, only JPRN included information for participation in clinical trials. Meanwhile, the accessibility of the German website was exceptional, with features for adjusting font size and font color contrast.

Registry	Information or Content										
	For medical professionals										For patients
	About HP	Contact	News	Help	Links	Search methods	Associated information on clinical trials	Statistics	FAQs	Terms	
Australian New Zealand Clinical Trials Registry (ANZCTR)	✓	✓	✓	✓	✓	✓	✓	✓			
Brazilian Clinical Trials Registry (ReBec)	✓	✓	✓	✓							
Chinese Clinical Trial Registry (ChiCTR)	✓	✓				✓	✓	✓	✓		
Clinical Research Information Service (CRiS), Republic of Korea	✓	✓						✓	✓		

Clinical Trials Registry India (CTRI)	✓	✓				✓				✓		
Cuban Public Registry of Clinical Trials (RPCEC)	✓	✓	✓	✓	✓							
EU Clinical Trials Register (EU-CTR)	✓	✓	✓		✓	✓	✓			✓	✓	
German Clinical Trials Register (DRKS)	✓	✓	✓	✓	✓		✓			✓		
Iranian Registry of Clinical Trials (IRCT)	✓	✓			✓		✓			✓		
ISRCTN.org	✓	✓			✓	✓	✓			✓		
Japan Primary Registries Network (JPRN) after 2014	✓	✓	✓		✓	✓	✓			✓	✓	✓
Thai Clinical Trials Registry (TCTR)	✓	✓										
The Netherlands National Trial Register (NTR)	✓	✓										
Pan African Clinical Trial Registry (PACTR)	✓	✓			✓							
Sri Lanka Clinical Trials Registry (SLCTR)	✓	✓					✓					
ClinicalTrials.gov	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
International Clinical Trials Registry Platform (ICTRP)	✓	✓	✓		✓	✓	✓			✓	✓	

**Table 1:** Summary of the content and information offered by clinical trial information websites worldwide.

Primary Registry	Information or Contents													
	About HP	Contact	News	Help	Links	Search methods	Associated information on trials	Statistics	FAQs	Terms	Commentary on the disease	Common medicine	Clinical trials overseas	Medicine overseas
Japan Primary Registries Network (JPRN) before 2014	✓	✓	✓		✓		✓		✓	✓				
Japan Primary Registries Network (JPRN) after 2014	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓

**Table 2:** Contents and information from old and new Japanese clinical trial information websites.

In contrast to most countries' registries, whose users are medical personnel or researchers, the Japan Primary Registries Network (JPRN) provides clinical trial information gathered from three different registries with the mission of making the collated information available to the public. Indeed, the users of the JPRN website include patients and the public, in addition to registered medical personnel and researchers (Table 2). And ClinicalTrials.gov also had pages for three users such as "For Patients and Families", "For Researchers" and "For Study Record Managers".

### Features of the new portal website in Japan

The new portal website provides information separately for patients and healthcare providers (Figure 1). The aesthetic aspects of the website were likewise reconsidered with the aim of improving the degree of recognition of clinical trials. Illustrations and icons were used to introduce "The Purpose of Clinical Trials" and "The Purpose of the Portal Site." A search bar was added at the top of the page allow easy searching.

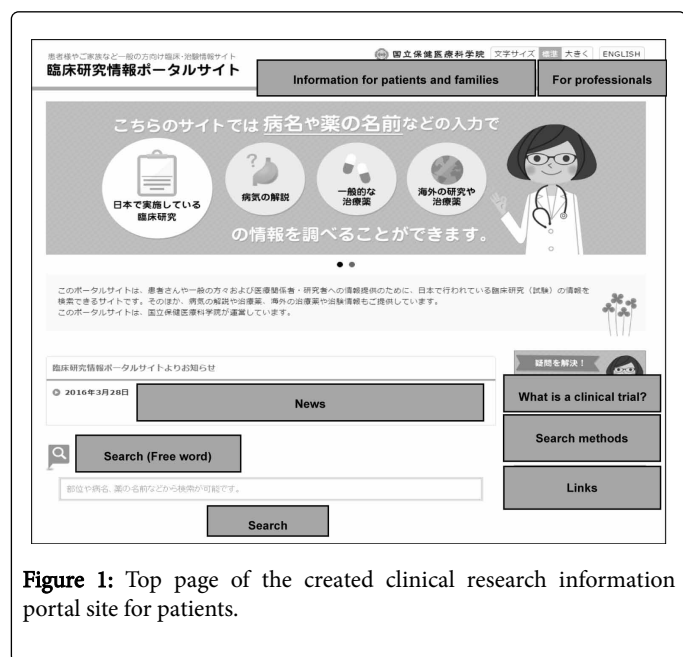


Figure 1: Top page of the created clinical research information portal site for patients.

The portal website for patients (general population) provides reliable information on drugs and diseases, whereas that for clinicians (healthcare providers) provides a detailed search of clinical trials. Information on domestic and foreign market drugs and clinical trials is also updated regularly. Further, usability improvements were achieved by enhancing text readability (highlighting of the search terms), offering English information search using an automatic translation function, and providing editing for inconsistent spelling in search terms.

### Information for patients

The structure of the portal website for patients is shown in Table 3. The redesign of the website added descriptions of diseases as well as updated information on curative medicines and overseas clinical cases. Explanatory contents on clinical trials were also expanded.

For example, when "Parkinson" is searched, a list of related trials is shown, and when "details" is clicked, information on individual clinical trials is shown, as in Figure 2. A menu on the right-hand side of the site enables filtering per search result (e.g., progress status, age and sex of patients, registration date for the clinical case, and location of facility conducting the clinical trial). Users can also follow registered information in each institution after searching on this website. When the name of a disease is entered, various types of information are separately introduced under the tabs.

The portal website shows: 1) An "explanation of disease" section provided by Japanese research societies and institutes, 2) Medicines used in Japan based on the JAPIC CTI supplement "Medication database," 3) Medications used overseas based on the US Food and Drug Administration and European Medicines Agency, and 4) Status of clinical trials overseas in cooperation with the ICTRP. Previously, to search for ongoing similar clinical trials conducted overseas or find the approval and authorization status of clinical trials, users had to search in separate websites using appropriate search terms. In the present portal website, however, users can obtain information on clinical trials inside and outside Japan, diseases, and medication in one place and from credible sources, namely, public institutions. The website is also meaningful for patients with incurable and rare diseases, who tend to have limited access to available relevant medical information that can help them, decide on their appropriate treatment.

For example, when one searches for information on Parkinson's disease using the new website, the search is started by entering "Parkinson's disease" as a search term. The search then yields the following information: 180 clinical trials; 120 "explanations of disease" from Japanese incurable diseases centers or various research societies; 120 "medications" according to drug classes; and 2,389 "clinical trials overseas" (as of April 2016). The website also includes a "What is a clinical trial? How can you participate in clinical trials?" page, which offers a step-wise explanation on clinical trial participation.

Meanwhile, the FAQs and glossary are organized by stratifying them according to the order of the Japanese syllabary.

Search methods
Associated information on clinical trials
Commentary on diseases
Common medicine
Status of clinical trials overseas
Overseas medicine
About clinical trials (What is a clinical trial? How to participate in clinical studies)

Table 3: New items on the site for the public.

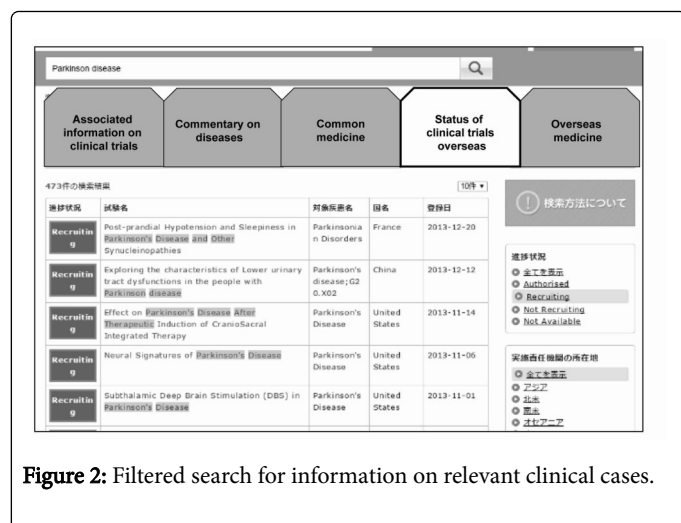


Figure 2: Filtered search for information on relevant clinical cases.

Compared with the case of regular clinical practice, patients participating in clinical trials face difficulties in communicating with physicians, and as the informed consent form tends to contain highly technical medical terms, they may have many different questions that are not typically included. Thus, the National Institute of Public Health created a checklist for patients that summarize the items to be noted by physicians prior to explaining clinical trials to patients [17]. Patients can check off and print out the items that are particularly important for them and bring the sheet on their doctor's appointment. The sheet should be able to encourage patients to participate in clinical trials by helping them understand the nature of the trials through informed consent. These contents are subject to improvement based on future surveys of patients. Links are given to research society information, which explains diseases and patient meetings, and patients can directly confirm information from the link.

On the new website, patients are able to obtain information on diseases, medications, and clinical trials inside and outside Japan simply by entering the name of the disease. It is a useful one-stop type of database for patients to obtain accurate medical information, including clinical trials. Indeed, it is already being used in referencing clinical cases of new medicines at patients' meetings for intractable and rare diseases.

## Discussion

### Revision initiatives for Japanese clinical trial information websites

The JPRN portal website was launched in March of 2008. This portal website was created to disseminate information on clinical research registered in Japan, simplify searches for information, and provide information to the public and researchers. The portal website enables cross-searching as it integrates data from the University Hospital Medical Information Network (UMIN) Center [11], Japan Medical Association Center for Clinical Trials (JMACCT) [12], and Japan Pharmaceutical Information Center Clinical Trials Information (JAPIC CTI) [13], all of which are operated as independent registry centers.

On October 16, 2008, JPRN, which consisted of the registry centers mentioned above as well as the National Institute of Public Health, Ministry of Health, Labour and Welfare, and Medical Political Research and Development Promotion Division, was recognized as the

eight best in the world on the Primary Registries list of the World Health Organization (WHO) [9]. Registered information on clinical trials in Japan is sent to the WHO by the National Institute of Public Health and integrated into the ICTRP [14]. The number of clinical trials that were newly registered between April 2015 and March 2016 was 5,600.

As of March 2016, the database contained approximately 24,660 (UMIN: 21,350 trials, JAPIC CTI: 3,110 trials, JMACCT: 200 trials) clinical trials, and the top page recorded 68,503 views on average each month. Of these views, the average number of visits to the search page was 3,495, and there were 5,613 searches on average every month.

We previously conducted a related research to make this website easier to use and enhance provision methods [15]. To solve the information needs and problems that were identified in the study, we restructured the contents of the website, improving the search function, website structure, and convenience.

### Information for researchers and medical professionals

The new website for medical professionals allows free word search and advanced detailed search with various conditions. An "and/or" search function has been implemented, enabling searches of multiple diseases at one time.

Information on medications is based on the JAPIC "treatment drug database." Disease explanations are culled from publications by national research institutions, such as research societies of each area and the National Cancer Center. The website is expected to be used by clinical research coordinators, such as pharmacists, doctors, or nurses; pharmacists; and various practitioners involved in medical and welfare support. In the future, we aim to analyze information on registered clinical trials inside and outside Japan and then publish relevant statistics. We believe the website is also useful in daily clinical practice, when clinicians need to search for information on clinical trials for their patients and on drugs used in Japan, investigate the approval status of medications overseas, and create research proposals for clinical trials. The website is also a useful material for medical doctors to introduce clinical trials to their patients. As previously mentioned, we anticipate the website to become a support tool for patients and medical professionals.

### Limitations and future direction

The new portal website can be utilized as a one-stop type of database that provides information on diseases, drugs, and clinical trials inside and outside Japan. Patients only have to enter the name of a disease. At present, the new JPRN portal outperforms other national registries in terms of its substantial content for patients. However, the sites of China, South Korea, Australia, and NZ are superior to the JPRN site in that they provide invaluable statistical information, including research trends. This point is under consideration for improvement in future modifications of JPRN sites.

We intend to expand the clinical trials coverage and promotion activities, as well as foster information dissemination and raise awareness by distributing search windows in research conferences and patient meetings. Further, we plan to improve usability by conducting user evaluation, in addition to improvement of website contents. We hope that this website will become the portal for patients and clinicians to obtain accurate information and contribute to the promotion of clinical trials and overall progress of medicine.

## Conclusion

The new site of clinical trial information of JPRN is a patient-centered portal site widely supporting patients' medical treatment living in order to provide information on "Commentary on diseases", "Common medicine", "Status of clinical trials overseas" and "Overseas medicine" for each disease in addition to "Search methods", "Associated information on clinical trials", and "About clinical trials".

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