Turning Research Into Practice (TRIP). Jon Brassey, TRIP Database, 12 Llansannor Drive, Cardiff, UK, CF10 4AW; jon@tripdatabase.com; http://www.tripdatabase.com; free Website.

The Turning Research Into Practice (TRIP) database was launched in 1997 as a medical search engine with a focus on evidence-based medicine (EBM) content. The initial purpose was to speed up the process of answering clinical questions by offering users a one-stop shopping approach to searching. Instead of jumping from one resource to another, the TRIP database allows users to search many at one time [1].

The resource began as an Excel spreadsheet with three fields: title, uniform resource locator (URL), and year of publication. To search the spreadsheet, users were limited to the ''Find'' function offered in Microsoft products. Eventually, the resource became Web-based and received its permanent URL in 2000. With its growing content and increase in use, the developers decided to make the resource available through subscription in 2002 to generate revenue to improve the resource. However, to keep with the spirit of accessibility and in turn to ease users into subscription-based access, resource users were allowed to search five times free per week. On September 1, 2006, the resource was relaunched as a free online resource [1].

One of the nice features of the TRIP database is that results are displayed in categories based on Haynes' work on the 4S approach to current best evidence of studies, syntheses, synopses, and systems [2] (described on the TRIP Website). The TRIP categories are: Evidence-based Synopses; Clinical Questions; Systematic Reviews; Guidelines (North American, Europe, Other); Core Primary Research; eTextbooks; Clinical Calculators; and core general medical journals retrieved from MEDLINE (PubMed). Each of these categories searches a number of resources to produce the results. For example, the Evidence-based Synopses searches Bandolier, BestBets, POEMs, Clinical Evidence, Evidence-based Complementary and Alternative Medicine, and many more.

To further understand the Website and resource inclusion process, the reviewer read through the About Us pages of the Website. The Websites and resources included in the TRIP database are systematically selected using a site evaluation tool. TRIP works closely with the Department of Family Medicine at Laval University, Quebec, Canada, in this process. The department has put together a Directory of Clinical Information Websites, which includes over 100 critically appraised Websites that offer systematic reviews, clinical practice guidelines, and critically appraised topics. TRIP looks at these Websites and evaluates them using an in-house evaluation tool and a team of information experts and clinicians. Once a Website has passed the test, it will become part of the ''grabbing'' process.

The ''grabbing'' process begins with identifying the clinically relevant material in a preapproved Website. Then the title, URL, and date of publication is extracted and entered into the TRIP database. The TRIP spidering software is then used to visit the URLs entered into the database and grabs the content of that particular page. It is then processed and ready to be searched in the TRIP database. The database is updated monthly.

The reviewer found searching the database relatively easy and straightforward. TRIP states that it takes unknown search terms and matches them against a commonly misspelled word database to try to retrieve matches. TRIP also searches for any keywords and/or synonyms matching valid search terms entered. The database can be searched using Boolean operators as well as natural language searching. The reviewer took a question regarding oral rehydration versus intravenous therapy for gastroenteritis in children aged two to five years and tested it using a few different approaches.

The first attempt was to enter search terms into the general search box on the home page combing the search terms with a Boolean ''AND'': ''gastroenteritis AND oral rehydration therapy AND intravenous therapy AND children.'' The search yielded forty-two EBM-filtered results and thirty-two MEDLINE (PubMed) search results. At first glance, the forty-two results appeared relevant. Some seemed irrelevant, but it was a manageable number to look through and the pre-identified systematic reviews, guidelines, and excerpts from electronic textbooks appeared.

The PubMed search that TRIP does automatically retrieved thirty-two articles. The exact same search was run in PubMed and retrieved seventy results. The reviewer wondered why there would be a difference in the number of results and found the answer to this question in TRIP's About Us pages. When TRIP searches PubMed, it uses the clinical queries search filters offered in PubMed that limit the search results to a specific clinical query category (therapy, diagnosis, prognosis, and etiology). This made sense and was consistent with the categorization by question type for users to quickly identify what type of article they require based on the type of question asked.

Another PubMed feature allows users to further focus a search in PubMed by selecting a specific specialty. It is also noted in the TRIP searching pages that the database goes beyond the filters and includes articles from the top five general internal medical journals (*New England Journal of Medicine, JAMA, Lancet, BMJ,* and the *Annals of Internal Medicine*) for the past five years, as well as the BMJ Updates.

The second approach to searching the TRIP database involved using the natural language offered by the database. When the reviewer viewed the results, a sentence appeared below the search box: ''Do you mean: gastroenteritis oral rehydration therapy intravenous therapy children?'' This option was selected to see if it would make any difference, but it did not change the number of results. This is a nice feature for those not familiar with

or confident in using Boolean operators for searching. However, the reviewer does not recommend relying on this method of searching. The reviewer entered a question phrase regarding the original example search into the search box and only received a few hits. The results were not relevant and missed the systematic review and current guidelines.

The next step was to rerun the original search string and note whether it was searched in the ''title'' or the ''title and text'' of the documents. The search was run again, and, when the results appeared, the reviewer clicked on ''Advanced Search.'' The screen showed the search string had been run in the ''title and text.'' When ''title'' was selected, the search was considerably limited and only retrieved one clinical question, but the same thirty-two results were retrieved from PubMed. The reviewer felt that it would be best to test this approach again with another search to determine whether this was a true representation of the ''title'' versus ''title and text'' feature.

The TRIP search page describes the search algorithm used to score the content. It states that TRIP scores content based on three main variables. The first is year of publication, so current material receives a higher score. The second variable is term position/density. This means that the algorithm scores material based on the position of the term in the document (term in the title is given a higher score than if it is in the text). It also scores documents on the number of times a term appears in the document (number of appearances of the term divided by the total number of terms). The third variable is the publication. When a Website or resource is evaluated at the beginning of the process, it is also given a score. The scores are based on clinical usefulness and methodological quality.

The reviewer explored the advanced search feature as well by trying to search each concept separately and combining them using ''AND'' but only retrieved one result. After reading the Search Help Page, the reviewer revised the strategy based on the suggested methodology. TRIP suggests that the best way to combine search terms is to search the ''title'' for the condition and then search ''title and text'' for the intervention.

After users have done this, they should combine the search sets using Boolean operators. This approach received the same forty-two EBM filtered results that the original search yielded. However, it did not retrieve any PubMed search results, which is puzzling. The reviewer assumes that the use of numbers to combine the search is not recognized in the PubMed database because it could not read the search history in the TRIP database.

My Trip is a current awareness–type tool. It allows users to register and select keywords that are automatically searched when the database is updated. If material is retrieved, the results are automatically sent to users by email.

Two important features of the TRIP database are its Medical Images and Patient Information Leaflet options. When users run a search in TRIP, it automatically retrieves any available images and patient information leaflets. This is a fantastic feature. The original search did not retrieve any medical images but did retrieve some great patient information that would be very useful for clinicians to provide to their patients. Some of the resources that appeared with this search were from NHS Direct, eMedicine, and the Merk Manual. More about what resources are searched for Patient Information and Medical Images can be found in the lists under the About Us pages. A few consumer health information resources could be added to the list, but the reviewer applauds TRIP for incorporating patient information features into the database.

Advertising can be found throughout TRIP's Web pages. While advertising is frowned on, TRIP makes it clear on their Website that advertising is simply a way for the company to gain revenue as they no longer rely on subscription revenue. A team of clinicians, consumers, and staff review sponsored advertisements. TRIP also states that they are not by any means influenced by sponsored advertisers and/or pharmaceutical companies. This disclaimer can reassure users that they are entering a resource that is not biased and truly does abide by evidence-based principles.

Because TRIP is moving toward free access, the reviewer wondered what might be next for it. In September, Dean Giustini, reference librarian, Biomedical Branch Library, University of British Columbia, interviewed Jon Brassey, one of TRIP's cofounders. He asked about the move to free access and plans for TRIP. Brassey answered with a few ideas of interest. He discussed becoming compatible for personal digital assistants (PDAs), a related articles feature, and an ''ask us a question'' option. Although these are still only ideas, it is nice to see TRIP's keen interest in expanding this evolving resource [3].

The TRIP database has come a long way from its conception. The reader may wish to consult a 2002 review of the database [4]. The thought put into the design and improvements made to this resource prove that it is truly dedicated to the practice of evidence-based medicine.

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Facts and Comparisons 4.0. Wolters Kluwer Health, 161 West Washington Street; #1100, Conshohocken, PA 19428; 800.223.0554; http://online.factsandcomparisons.com; contact for pricing, free thirty-day trial available.

Overview

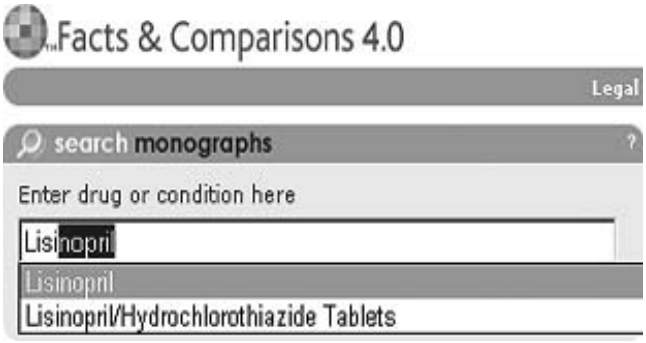
Wolters Kluwer Health, a leading provider of medical and pharmaceutical information for professionals and students, offers Facts and Comparisons, a drug reference tool. It is available in various formats: as a loose-leaf, on CD-ROM, and now as a browser-based electronic version. The reviewer tested the electronic version of Facts and Comparisons. Version 4.0 also offers an integrated packet of all reference tools available in the print and CD-ROM versions. The Web version comes with about ten drug reference tools, including the Form Checker Formulary Management tool and Black Box warnings. The Cancer Chemotherapy Manual—which provides detailed information on ordering and administering chemotherapy, safe handling, and chemotherapy regimens—is an add-on product. Off Label drug facts is also an add-on.

Searching in version 4.0

Both simple and advanced search functions cover all integrated reference tools contained in Facts and Comparisons 4.0. Drug Facts and Comparisons is a comprehensive drug information compendium covering more than 20,000 prescription drugs and over 6,000 over-the-counter drugs. Users can perform a search on generic or trade name drugs and conditions. Search results are returned in a hierarchical order, making it easy to understand which monograph contains what information. A simple search on Lisinopril displays results by monograph and by subsections in the reference.

I could refine my search from the suggested matched terms. The ''new word wheel'' functionality is very useful (Figure 1). I just typed the first few letters of the drug name, and the word wheel assisted me in picking the correct term. I find this feature very handy, especially when dealing with obscure drug names or terminology.

Figure 1
Word wheel



Results for Lisinopril also offer complete prescribing information specific to the route of administration (Figure 2). For example, when I clicked on the Monograph link, I saw that Lisinopril is offered via oral route.

One thing may be a little troubling to a novice searcher. When I clicked on the Oral route of Lisinopril, I retrieved detailed product information (Figure 3) and could have retrieved the same information if I had just clicked on ''All Hits!'' This can be confusing to a novice searcher.

I also did like the cross-reference feature. From the main results, I could select related monographs—like Med Facts Patient, Drug Interaction Facts, A to Z Drug Facts—to obtain comparative prescribing information, indication, treatment guidelines, dosage, pharmacology, pharmacokinetics, information on clinical trials, precautions and warnings, drug interactions, patient information, and much more.

Alternative view feature (View All) lets users sort documents in a database by the monograph name and then by the section of the document in which the drug information is found. This provides a seamless transition for information providers who are used to the print versions of Facts and Comparisons.

Med Facts handouts provide information in English and Spanish and are designed for patient education, counseling, and drug therapy management. The information is in a very easy-to-read format with small paragraphs or bulleted lists. It also provides information on orphan drugs and discontinued products when available.

The Drug Identifier tool allows users to identify drugs by imprint, generic or trade names, labeler or manufacturer, color, shape, or National Drug Codes. It also links to other documents from drug facts, A to Z Drug Facts, Med Facts Patient, and so on.

I particularly liked the Drug Interaction Facts (Figure 4). It allows users to access comprehensive information on drug-drug and drug-food interactions in a quick reference format. Information is compiled from primary biomedical literature and over 1,200 interaction monographs. It is also critically evaluated to check the appropriateness of methods and procedures. All interactions are indexed with their significance rating under both generic and brand names drugs. The significance rating and severity information are explained in the help section. Documentation of each interaction and a brief review and assessment of the cited studies is also provided. Citations are linked to PubMed. This is particularly useful for carrying out further research. It is not required to first search in the drug monographs to understand the drug interactions. The Interactions Checker lets users search for potential drug interactions from the main page of the database. Users can also include more

Figure 2
Suggested matched terms

than one search term. It also offers further possibilities of refining a search once users click on the Go button. This is probably the most useful feature of the database: providing drug interaction information in a very comprehensive manner.

The Review of Natural Products provides detailed information on natural products. This information about natural and herbal products is based on scientific research.

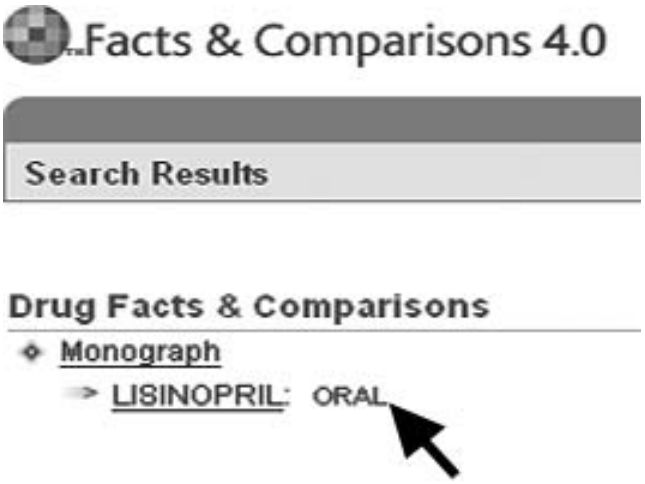
The Help section explains the technical information in an easy-to-read and understand format. The home page offers a number of frequently asked questions (FAQs) to help users determine if the product is right for them. In addition to general system-related technical questions, it also covers some very useful product-related questions like ''How would I cite information obtained through F&C 4.0?'' The answer provides examples:

> Minoxidil. *Drug Facts and Comparisons.* Drug Facts and Comparisons 4.0 [online]. 2005. Available from Wolters Kluwer Health, Inc. Accessed August 8, 2005.
> Kava. *Review of Natural Products.* Drug Facts and Comparisons 4.0 [online]. 2005. Available from Wolters Kluwer Health, Inc. Accessed August 8, 2005.

Pricing and updates

Academic libraries can purchase a license for a specific school or department. For example, a license can be purchased through the school of nursing. That way all students and faculty affiliated with the school of nursing can access the database. Libraries can also arrange for a restricted access only for authorized students and staff. Off-campus access can also be arranged. At last check for my very small library, the license price for version 4.0 ran somewhere around $2,000.00 for the nursing school. Version 4.0 is accessible via the Web and is updated daily. Updated information is also available on the main screen under the ''Toolbox.''

Figure 3
Clicking the Oral route for Lisinopril



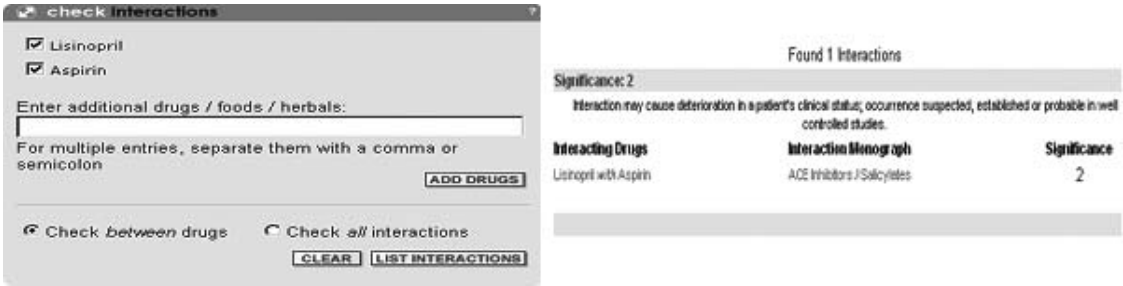
Weakness

The PDA version is not complete in that it does not cover all the reference tools, and this could have an impact on academic library decision making. Another weakness is its lack of coverage on international drugs. A search for Listril and lisinopril did not yield any hits in version 4.0. I have not thoroughly tested other comparable tools, but DRUGDEX covers Martindale Complete Drug Reference.

Conclusion

Overall, version 4.0 offers many good features. For nursing students and especially those who are in clinical practice, this product is a welcome addition to their resources. It is a well-organized, fast, and easy-to-navigate tool. It provides

Figure 4
Interactions Checker



comprehensive information from all integrated drug reference tools that the company offers. The provided information is not limited to only Food and Drug Administration–approved drugs. Drugs in the investigational stages are also covered. Information seems to be backed up by documentation, discussion, and comparable tables.

When it comes to purchasing an electronic product, user preferences and budget situation play an important role in any library's decision. The Web version of Facts and Comparisons is a pricy product, but, with all the features and fast, reliable current drug information, it is a strong candidate for academic library purchase.

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Healia. Healia, 9 Lake Bellevue Drive, Suite 106, Bellevue, WA 98005; 425.646.6030; fax, 425.650.9888; info@healia.com; http://www.healia.com; free Website; additional information on pricing for institutions, 425.646.6030 or bizdev@healia.com.

Purpose

Healia is a search engine and gateway to quality health information that employs patent-pending algorithms for retrieving filtered, personalized, and accurate results. It was developed with consumers and patients in mind; however, health professionals, researchers, and librarians will find it useful as well.

General description and background

Healia's chief executive officer, Tom Eng, has spent most of his career developing health-related information technology and employing emerging technologies to improve health care, specifically in the field of public health, both in the United States and abroad. In 1999, Eng first envisioned a consumer health search engine that would deliver high-quality results, and, in 2001, he received a Small Business Innovation Research Award from the National Institutes of Health to develop it. The National Cancer Institute assisted with research and development, and Healia was incorporated in March of 2005.

It took Eng about six months to decide on a name for this search engine. Part of the name is ''Heal,'' from the word ''health,'' and the other part is derived from Helios, the god of the sun in Greek mythology who sees and knows all. Healia became available to the public in September of 2006.

Healia is a consumer health search engine that uses filtering algorithms to enhance the accuracy of results and the retrieval of personally relevant health information. Filtering options, together with the optimized search engine technology, create a powerful combination for producing targeted results.

The search engine is available to the public at no charge, but institutions can license the Healia technology specifically for use through their Websites or other Web-enabled applications. The licensed version of Healia is free of advertisements and customized to complement the ''look and feel'' of each institution's Website or application, including portals, interactive tools, and electronic medical records. Its priced is based on the number of users and the extent of customization. Healia currently licenses its technology to AARP and the US Department of Veterans Affairs.

Content

Healia covers the full gamut of health information, indexing thousands of sites from sources such as MedlinePlus, ClinicalTrials.gov, and New York Online Access to Health (NOAH). Healia uses algorithms to calculate a ''Quality Index Score'' that looks at variables correlating health topics with quality content. Results are based on the relevancy of the content to the search terms and the quality of the content.

The consumer can decide how to tailor the search results by using

filters for age, gender, reading level, and so on. From the search results, Healia links the user to the full-text version of each resource.

Intended audience

Healia's main audience is consumers and patients; however, health professionals, librarians, and researchers can benefit from using this search engine as well. The product has a filter for ''professionals'' that targets the health professional or subject area expert and assumes a higher level of biomedical knowledge.

Major features

■ **Basic search:** A user who wishes to perform a basic keyword search can choose to turn off all filters, enter keywords into the text box, and press the Enter key. By default, Healia returns results that include all search terms entered, and the order of the search terms does affect the results. If the user enters an acronym such as ''ert,'' Healia will provide a list of expanded search terms. For example, the expanded terms for ''ert'' are: ''estrogen replacement therapy,'' ''emergency response team,'' and ''environmental response team.''

■ **Suggested search terms:** Based on complex mapping and relationships of thousands of health-related terms, Healia displays similar, more general, and more specific search terms for each query entered. This feature is helpful to the user who may wish to add related terms or concepts to a search. Users can search for information on diseases or disorders, conditions, symptoms, drugs, procedures, and surgical operations.

■ **Suggested search result:** When the user enters a search term, a ''suggested result'' from a reference Website is displayed above the list of results. The suggested result usually defines a disease or condition in some detail.

■ **Personal search:** This feature is unique to the Healia search engine and presents the user with a number of filters for personalizing the search results. Filters are offered in the following categories for targeted results:

—Professionals: those with a higher level of biomedical knowledge
—Gender: males or females
—Age groups: children, teens, or senior citizens
—Ethnic groups: including those of African, Asian, or Hispanic heritage as well as Native Peoples
—Reading levels: basic (written at high school level or below) and advanced (written at college level or above)
—Accredited sites: either self-accredited by the Health on the Net Foundation (HONcode) or accredited by the URAC Health Web Site program
— Sites with specific attributes: such as easy to scan, fast to load, suitable for text browsers, and interactive tools available (calculators, quizzes, assessment tools)

■ **Contextual filters:** When searching for information about a disease, health condition, or drug, the following contextual filters are automatically generated, allowing the user to place additional limits on a search:
—Prevention: the prevention of a disease or health condition
—Causes/Risks: causes of or risk factors for a disease or health condition
—Symptoms: signs or symptoms of a disease or health condition
—Diagnosis/Tests: diagnosis of or tests for a disease or health condition.
—Treatment: treatment options for a disease or health condition.
—Dosage: drug dosage information
—Uses: uses or indications of a drug.
—Side Effects: possible adverse reactions to a drug

It is important to note that these additional search filters are displayed only when searching for information on a disease, condition, or a drug. These search filter tabs are not available when searching for information on a pathogen, procedure, or surgical operation.

■ **Search history:** Healia records the user's last ten searches, but this information is erased when the browser is closed. The search history includes not only terms typed into the query box but also any ''suggested search terms'' the user selects.

■ **Font size:** The user has the option of viewing the results in a different font size by selecting the Font Size icon at the top of the screen. Choices are normal, large, and extra large fonts.

Accessibility and usability

Healia has been successfully tested with screen readers for the benefit of the blind, according to Eng.

In addition, the usability of the Healia search engine has been tested by focus groups consisting of librarians, consumers, and health professionals. For example, the focus groups suggested that the product should have an extensive ''Help'' page that explaines the various filters instead of ''pop-up'' text boxes that provide definitions upon selection of the filters.

Whenever a user executes a search, the results page displays a ''Feedback'' tab at the top of the screen. Healia staff would like to receive comments from users who experience any difficulties navigating the site or retrieving information.

Advantages

A notable advantage of this search engine is that the user has the ability to limit a search in various ways, producing personalized, targeted results. In addition, it is helpful that the user can turn off the filters to perform a basic search when desired.

The search results link the user to reputable sources of health information and to the full text. Healia is, therefore, successful at connecting the consumer to reliable health information at the point of need in a useful format.

Disadvantages

For those accustomed to using PubMed's search history feature, it may be disconcerting to see that Healia's search history is erased each time the browser is closed. At present, there is no option for retaining that search history due to privacy concerns, according to Eng. If Healia could enable the user to save searches to a clipboard or a folder, that would be a major improvement.

It may be confusing to consumers to see contextual filters appear when searching for information on diseases, conditions, or drugs; yet, those filters disappear when searching for information on pathogens, procedures, or surgical operations. Offering context-sensitive filters when searching for articles on pathogens, procedures, or surgical operations would be an improvement.

Healia does link the user to some Websites managed by pharmaceutical companies, so it would be helpful to have a filter allowing the user to remove these from the results, if desired. The influence of pharmaceutical companies has received attention in the press recently due to relationships among the drug companies, practicing physicians, and medical educators that could adversely affect patient care [1, 2]. There is also a concern that some drug company Websites emphasize the benefits of their medications without frequently updating information on the adverse effects of those medications [3].

Technological administration

If users have Internet service, they should not have technological problems in terms of gaining full access to Healia. The only requirements are Internet access and a standard Web browser; no software installation is required. Institutions will need to include a line of code on their Websites to provide access to Healia. No further support is needed, because all updates and maintenance for the search engine are handled by Healia's staff.

Timeliness

Healia is updated on a daily basis, using a proprietary, patent-pending algorithm to crawl the Web and evaluate quality health-related content.

Similar products

According to Eng, two of the major competitors are Google and Healthline. Google has librarians add content to its health section, but Healia takes a different approach by having a proprietary algorithm do the work. A detailed comparison of these very different approaches is beyond the scope of this review.

Healthline, a consumer health search engine that delivers quality results, is comparable to Healia in some ways but does not offer the numerous filtering options for more personalized results. Healthline has HealthMaps that enable the user to visually explore relevant resources and information about health topics, and this is a nice feature. Nevertheless, for the user who wants to exercise more control in terms of personalizing the search results, Healia is the better choice.

Future plans

Healia's main goal for the future is to continue to use cutting-edge technology to produce quality search results. Specific enhancements planned are: (1) allowing the user to limit search results to resources included in PubMed and (2) implementing a ''discovery engine'' to make it possible for the user to explore relationships between search terms and other health concepts.

Conclusion

The most notable features of Healia are:

- a patent-pending algorithm to ensure quality results
- contextual filters and semantic technology to suggest alternative search terms
- filters and algorithms for personalizing the search results
- integration of Healia's search engine into other Web applications such as portals, interactive tools, and electronic medical records

Eng and Healia's staff are continually working to improve the search engine, so they would welcome feedback from librarians. Comments can be sent to info@healia.com.

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MedStory. Medstory, 1065 East Hillsdale Boulevard, Suite 404, Foster City, CA 94404; 650.212.1102; fax, 650.212.1103; info@medstory.com; http://www.medstory.com; free Website for personal use.

There's a new kid in town
I don't want to hear it
There's a new kid in town
I don't want to hear it
[''New Kid in Town,'' The Eagles]

So many different health search engines are available, readers might very well be tired of hearing about the new ones. They start up, do a bit little new, a bit the same, and quietly fade away. Most people just use Google, and why not? It has been a long time since the reviewer was really excited about a new Internet search engine focusing on health. But now there is MedStory.

Background

This new kid in town is following in the footsteps of such other hot new players as Kosmix, ClusterMed, Healia, and Google: Coop: Health (which has recently been folded into Google proper). All of these use a new approach to searching called clustering. They allow you to enter a medical term, and then they make suggestions for focusing your search that are based on automatically grouping the results into categories of pages that have information in common. This new approach is exciting, and all of these new search engines are worth exploring, testing, and comparing. MedStory is, however, the one that

Table 1
Comparison of groupings for refining these results

Google	MedStory (Health Tab)	MedStory (Research Tab)
• Treatment	• Drugs & Substances	• Drugs & Substances
• Tests/diagnosis	• Conditions	• Conditions
• For patients	• Procedures	• In Clinical Studies
• From medical authorities	• In Clinical Studies	• Molecular Biology
• Symptoms	• Complementary Medicine	• Genes
• Causes/risk factors	• Personal Health	• Research Centers
• For health professionals	• Nutrition	• Experts
• Alternative medicine	• People	• Anatomy

makes this reviewer's toes tap and want to start dancing.

MedStory was released officially in July of 2006. As of this writing, it is currently in beta release, with no date available for the final version. The key players behind it are Alain T. Rappaport, Timothy B. Choe, and Jay M. Tenenbaum. Rappaport and Tenenbaum both are experienced artificial intelligence researchers, with experience between the two of them in robotics, molecular medicine, drug research and development, knowledge engineering, and electronic commerce applications.

Search features

MedStory groups items into categories that make sense for clinicians as well as the general public, and it is pretty clear which is which. The categories show users graphically how the results group, what the main groupings in a top-level group are, who the main researchers in the area are, and what is complementary or alternative. Not only that, but the sponsored links are in a different part of the page and actually labeled as Sponsored Links. The About MedStory page describes what they are doing as, ''What we offer is not limited to high-level categorizations or popular URLs—it's presented with granularity not otherwise available on the Web today. Our goal is to enable a productive interaction for every search in health and medicine.''

A simple search for ''diabetes'' produced around 9 million hits, compared to Google's 132 million hits. The results appeared to be quite relevant, focused explicitly on health and/or research, with superior relevancy ranking. The strength of MedStory lies in the conceptual overview provided for each search topic and in the options provided for refining and focusing a search. Both these functions are fulfilled by the same part of the screen display. Table 1 shows how the two search engines compare in their next level groupings for refining these results.

MedStory offers two tabs that immediately sort the results into those for the general public (the default) versus the Research tab for clinicians and researchers. Each of MedStory's eight categories displays the five top clusters under that category, with a bar graph showing the approximate number of results that fall into that group. For the general public, a person unfamiliar with diabetes would immediately notice that the most important concept connected with this disorder is insulin, that there are different types of diabetes, that diabetes relates to high blood pressure and obesity, that the most common medical tests and procedures for it are glycosylated hemoglobin and the glucose tolerance test, and that a major author on this topic is James Malone. This is before users choose any of the links! This can be very empowering for discovery search, when the searcher wants to learn more about a topic (as contrasted with locating a known item or specific piece of information).

The category groupings and bar graphs area is headed with a banner that states ''Information that Matters™: click below to refine your search,'' followed by a teaser, View More. If a user searches a broad or common topic like diabetes or cancer, clicking on View More can, give an astonishing expansion of the number of items listed in the bar graph. Figures 1 and 2 illustrate of the basic interface and the expanded view.

If users switch over to the research tab, they will find new topics to add to the mental profile for diabetes: the new treatment trends appearing in research, major organs affected, and more. In addition to this granular and graphic breakdown of results, MedStory also offers a quick breakdown by type of result, which will vary depending on what is available for the topic being searched. This second-level sort is independent of the categories and bar charts mentioned earlier and is available for both the Health and Research tabs. Some of the categories from various searches attempted include:

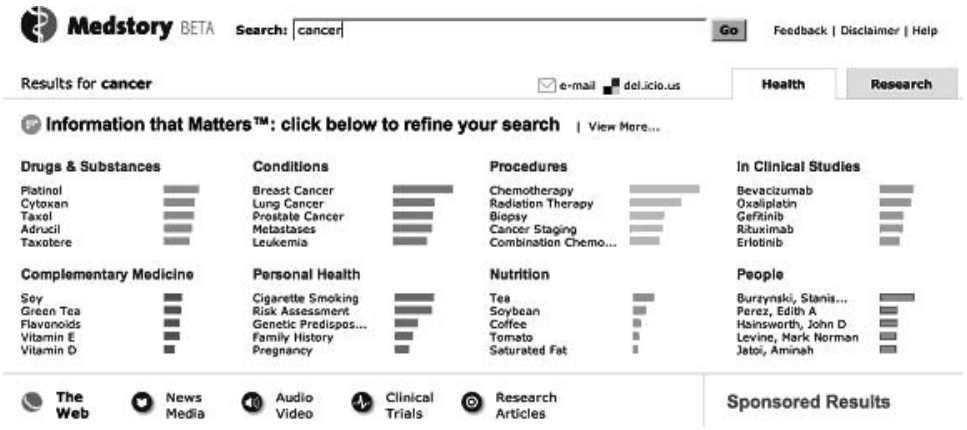
- Web
- Audio/Video
- News Media
- Clinical Trials
- Research Articles
- NIH Grants

To the limits of testing for this review, MedStory allows use of the common advanced search features and grammar used by many other major search engines but does not offer a separate advanced search page. Presumably, this is because much of the functionality from other advanced search pages is built into the standard display. A complex search yielded different categories for the results, limiting to

Table 2
Search results for ''(catheter OR catherization) (''infection control'' OR asepsis) (UTI OR ''urinary tract infection'')''

Google	MedStory (Health Tab)	MedStory (Research Tab)
• none	• Drugs & Substances • Conditions • Procedures • Personal Health	• Drugs & Substances • Conditions • Experts

Figure 1
MedStory standard results display



only the primary categories in which results are available. What is especially interesting is the results rankings. MedStory gives the appropriate clinical guidelines as the second link on the results page, while Google had the same guidelines listed in the fourth page of results.

Refining the search strategy further to ''(catheter OR catherization) (''infection control'' OR asepsis) (UTI OR ''urinary tract infection'') site:gov'' resulted in a loss of the granular menus, presumably because of the comparative paucity of results (n = 295), and a loss of the result-type menus, with results available only from the Web. This change of menus illustrates the responsiveness of the interface to the queries.

Usability and accessibility

Usability and accessibility of the MedStory site present a mixed bag, with some strong positive features, some room for growth, and a few significant concerns for certain audiences.

For the typical mainstream user, MedStory is easy to use but might require some adjustment, because the interface and display are based on choices and options not yet readily available in other search engines and are thus unfamiliar. An expert health searcher is likely to quickly distill the function and utility of the various displays. Each screen has so much information that it could be confusing or distracting for some people, while empowering for others. Novice health searchers or low-literacy patrons may very well struggle with the interface and terms used. It would be helpful to support a range of skills among searchers by including an embedded Reference category, like the other MedStory categories. This category could include such materials as general reference tools, dic-

Figure 2
MedStory expanded results display

tionaries, statistics, quick facts, overviews, thesauri, illustrations or images, organizations, encyclopedia articles, directories, and so on.

MedStory does not offer the option of setting personal preferences for display, such as number of items per results page. With the loss of an advanced search page, users also lose the functionalities of limiting search by language, file type, or geographic area, options that could be useful for some types of health inquiries. Although the search interface offers both a Health and a Research tab, results and options presented in both areas tend to favor health researcher and clinician rather than consumer health inquiries.

The Web page design is cascading style sheet (CSS) driven, as recommended by the World Wide Web Consortium (W3C) accessibility guidelines [1]. This makes the site responsive to many of the custom changes preferred by users with various special needs. For example, the page responds to user-controlled font displays and tends to scale well if font size is increased or decreased. Navigation breaks down with use of large fonts, as the JavaScript-generated graphic displays scale far off the right edge of the screen, while the text-based portions of the screen will wrap and adjust. Standard tools for testing Web-accessibility for users with special needs, such as WebXact and the W3C markup validation service, were unable to run scans of any of the results pages, leaving the reviewer concerned that the pages may not be accessible for users with disabilities.

There is no identifiable support for user error. Misspellings are searched as typed. If they do not exist in Web page content, they are searched in the URLs. For example, ''diabetesdictionary'' is searched in the URLs of Web pages, rather than properly parsed as ''diabetes dictionary,'' and no suggested spelling corrections are offered.

One particular feature demonstrates a strong sensitivity to the needs of many health searchers who want to share what they have found with others. This is true both of health care consumers, who share findings with friends and relatives, and for clinicians and researchers, who share with colleagues. MedStory offers the option to email a search strategy and results as a link and to post a search strategy to Del.icio.us, the most popular social bookmarking tool. Both of these offer ways to preserve search concepts and discovered resources, to support the research mentality and process, and to build a community of quality health searches in the broader community.

Conclusion

MedStory offers many special features that could easily make it especially attractive as a search tool for health care professionals. It is still excellent but less appropriate for health care consumers. MedStory could improve in some ways, primarily in the interface and options for health care consumers and more accessibility and responsiveness to users with special needs. The new features, options, display, and granularity make this a tool worth checking out, but not necessarily for everyone. Certainly, it is worth watching ''the new kid in town.''

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MedWatch: The FDA Safety Information and Adverse Event Reporting Program. US Food and Drug Administration, Center for Drug Evaluation and Research, 5600 Fishers Lane, Rockville MD 20857-0001; 888.463.6332; http://www.fda.gov/medwatch/; free Website.

Introduction

An alarming report issued recently by the Institute of Medicine (IOM) found that adverse drug events injure an estimated 1.5 million people each year, at a cost of approximately $3.5 billion dollars [1]. If these statistics seem inordinately high, consider that the numbers do not factor in lost wages, productivity, or additional health care costs incurred as a result of these injuries.

The National Academies, deeply concerned about the health implications of IOM's findings, urged government agencies, health care professions, and communities to work together to improve patient–provider partnerships, create new and improved drug information resources, and simplify complicated drug naming and labeling.

Background

Injuries and deaths attributed to medication errors and faulty medical devices occurred long before the Vioxx and Celebrex scandals shook the health care industry a few years ago. As the primary governing agency for pharmaceuticals and medical devices in the United States, the Federal Drug Administration (FDA) has a directive to investigate and make public any information associated with adverse medical events caused by the products they approve for use on the market.

To increase the discovery of adverse events in the general population, the FDA created a safety information and adverse event reporting service (AERS) called MedWatch. This service is freely available on the Internet and serves both health care professionals and the medical product–using public. Making MedWatch open and avail-

able on the Internet is crucial, considering most Americans are exposed to the potential risks of medical products. In fact, it is estimated that Americans spend an estimated $200 billion a year just on prescription drugs [2].

Purpose

MedWatch serves two main purposes. It offers AERS tools that allow medical professionals and the public to report medication errors and medical product injuries. MedWatch also provides clinical information about prescription and over-the-counter drugs, biologics, medical and radiation-emitting devices, and special nutritional products, such as medical foods, dietary supplements, and infant formulas.

Description

MedWatch focuses on drug and medical device reporting. It offers a choice between a voluntary reporting form, designed primarily for health care professionals and the general public, and a mandatory AERS reporting form, available to manufacturers, importers, and medical product user facilities that manage and store medical products. The latter group is required by law to submit the mandatory form immediately upon discovery of a product malfunction. Printable mail-in forms are available as an alternative to the online submission.

Review

The process of filling out and submitting the voluntary form is relatively simple. However, some language seems too advanced for the average user. Terms such as ''dose frequency,'' ''medical pathway,'' and ''event abated'' are unnecessarily complicated and possibly intimidating. However, the forms are brief and the user interface is basic, with big buttons, spacious form fields, and large font sizes. The form takes anywhere from ten to twenty minutes to complete, depending on how much detailed information the user wishes to provide.

The drug information section of MedWatch offers fresh news, medication alerts, recall information, and drug labeling changes conveniently delivered via email, through really simple syndication (RSS) or from the What's New section of the Website.

The Drug Labeling section is well organized, allowing users to view changes by month, going back to 2002. The Labeling Changes page allows an at-a-glance look at modified drug information and the specific section on the label that contains modifications. Clicking on the drug provides more detailed information about changes to warnings and contraindications. Content is cleanly displayed, and the language is easy to understand.

Summary

The MedWatch adverse event and reporting system allows anyone to report to the FDA injuries and/or deaths caused by medical products. Submitting a report is easy for the average user and only an Internet connection is required. Additionally, the MedWatch information service provides comprehensive, current information on drug alerts, recalls, and labeling changes and offers a variety of delivery methods including RSS, email, and a Current News section on the Website, which is updated regularly.

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