SHORT COMMUNICATION

SEARCH ENGINE FOR LABORATORY TEST IN PHARMACOLOGY

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ABSTRACT

Because in the present day, therapeutic drug monitoring, drug abuse and toxicology are important pharmacology-related laboratory. Physicians seem not be familiar to these tests. There are a lot of available laboratories, therefore, laboratory guideline is necessary. Computer technology using database search allows easy access to the detail of each laboratory request. Such laboratory search engine is a good instrument that can help physicians about request of laboratory tests. A new pharmacology laboratory guideline using database search by CGI system converted into HTML (hypertext mark-up language) documents that can be viewed by Netscape or Internet Explorer browser was developed. The software allows users to access the details of available laboratory tests (about type of the collector, amount of specimen, laboratory turnaround time, price of test and normal value). This software allows a real time search ability of requested search keyword to be linked (within less than 1 minute) and can be accessed by the Internet linkage. This new software was easy to use. However, it is not applied for the setting where Internet system cannot be available.The search engine would be helpful for the physician in request for laboratory test.

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Currently, therapeutic drug monitoring, drug abuse and toxicology are important laboratory tests in pharmacology. Preparation for these requested laboratory tests seem a difficult step in specimen collection procedure [1,2] due to the fact that there are many types of blood specimens for laboratory analysis, therefore, a lot of mistakes may occur during tube preparation on request. Furthermore, improper tube preparation can result in spurious laboratory results[3,4], therefore, guideline for tube preparation is necessary especially for a beginner in medical practice as medical students.

The previous study at Chulalongkorn University[2], revealed that knowledge about rational tube preparation of medical students is not good. One reason discussed is due to the problem of unavailable and difficult to use of the present tube guide. Furthermore, frequently asked questions by physicians are about cost and turnaround time of the laboratory tests. Therefore, new laboratory search-engine will help physician prepare for request for these pharmacological-related tests using Internet Database technology.

OBJECTIVE

The new laboratory search engine should be easy to use and available. It should be low cost and ease of use. Furthermore, it should be modern and attractive. Therefore, computer-based tube guide was innovated.

PRINCIPLE

New laboratory search engine should contain the necessary information in preparation as selection of tube, proper additive, specimen quantity, cost of the test and average turnaround time. Present laboratory guideline in use is documentary form, A4 paper size and difficult to transfer. With the concept that Internet is the newest and fastest method of communication[5]. Therefore, an innovative search engine tube guide via Internet was developed. Internet is modern and attractive because it can be used by computer machine, which is well supplied for medical students in the university.

METHOD AND MATERIAL

A new laboratory guide search engine using database search by CGI system converted into HTML (hypertext mark-up language) documents that can be viewed by web browser such as Netscape or Internet Explorer browser was developed. Intervention procedure (Figure1)

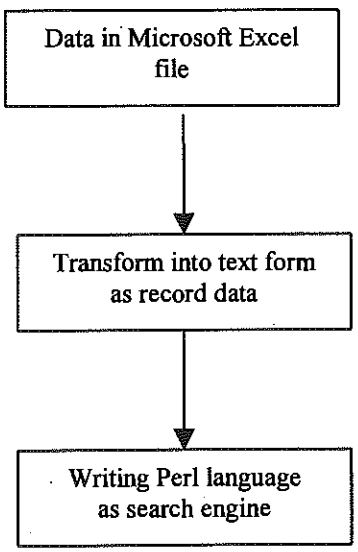

Figure 1. Flow chart of intervention procedure.

```
sub isMatch
# isMatch($line)
{
my $array;
my $temp;
my $line;

    $line = $_[0];

    @array = split(/\t/,$line);


    # is match ?

    for($i=0;$i<$query{numoffield};$i++)
    {

      $temp = $query{$i};

      if($temp ne "")
      {

        if( $array[$i] =~ /$temp/i )
        { # match !

        }
        else
        {
          return;
        }

      }

    }

    # match !!

    $match++;

    $myhtml .= "<TR>";

    for($i=0;$i<=$#array ;$i++)
    {
      $myhtml .= "<TD>";
      $myhtml .= $array[$i];
      $myhtml .= "</TD>";
    }
     $myhtml .= "</TR>\n";

}
    close(FILE);
```

Figure 2. Draft of CGI language used in this software.

PROGRAM TRIAL

This section displays an example of using this new search engine.

1. Accessing the search page by the Internet Explorer browser or Netscape

PHARMACOLOGY LABORATORY GUIDELINE

Enter specific field you want to restrict:

Test :

Search Clear

2. Adding the keyword for search
   For example : use the keyword "CYCLOSPORIN" in count in the first block as below

   สิ่งที่ต้องการตรวจ : cyclosporin

   Then press search button

3. Displaying of the searched result.

SEARCH RESULT :

สิ่งต้องการตรวจ	ตัวอย่างเลือดที่ใช้	ชนิดของหลอด	ปริมาณเลือดที่ใช้ (ml.)	เวลารับผล	ราคา	ค่าปกติ	หมายเหตุ
cyclosporin	EDTA	lavender	2	7 day	1800		

1. Create a Microsoft Excel file which contain all recorded data.
2. Transform all data in Microsoft Excel file into the text form, using tab to discrete between each field of data. Data in each column represent each recorded data to increase feasibility in data reading by the new invented program.
3. Using Perl language in writing the new invented program in CGI form (Figure 2). The reason for using the CGI language in writing is due to the fact that it is a simple language in writing search engine on the Internet. This new CGI program has disciplinary as accepting for keyword added by the used and matching the received keyword with recorded data in file. In case of proper matching, final results will appear on the screen.

The step in working of the new program is described below.

A. Accepting the data added from users in the screen.

B. The file will be opened then read column by column and checked with added keyword. The result shown varies on matching between added keyword and field. Regular expression using Perl language was used in checking and displaying of the result.

DISCUSSION

After introduction of this new laboratory search engine to some users, this computer-based media can bring user satisfaction. This software allows a real time search ability of requested search keyword to be linked (within less than 1 minute) and can be accessed by the Internet linkage, Netscape or Internet Explorer. This software can be used on the Internet (World Wide) and allow every user to access it. Considering consumer's behavior theory, the successful of any innovations must be based on satisfaction and acceptability of users. Furthermore, due to educational theory, if there is no good attitude, no successful result can be resulted.

Considering comment of the users, most subjects stated the attractiveness of the media but there are also some negative comments. One of interesting negative comment is the point that this media is computer-based, therefore, problem relating to availability of computer-machine, specific program and version-must be analyzed and solved.

Although this media has much advantage but there are still some limitations. Due to the fact that this media is computer-based, therefore, generalization of using is limited especially in the setting where computer network is not available. Therefore, this tube guide seems to be limited to the medical personnel in the university or large hospital only but it can reach the objective of the innovation to find the good media for beginner. In order to produce the more general effectiveness tube guide, further development of the technique is suggested. Not only the high technology computer-based media but also the other interesting types should be used.

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