Assessing the Quality of Anti-Cancer Drug Interaction Websites – A Pilot Study

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ABSTRACT

Cancer patients undergoing chemotherapy are particularly susceptible to drug interactions. While healthcare professionals utilize online drug databases to identify these drug interactions, the quality of online anti-cancer drug (ACD) interaction information is believed to be of varying standards. Several assessment tools have been developed to evaluate the quality of online health information but none specifically cater for assessing ACD interaction information. A tool for assessing the specific assessment of online ACD interaction information has been developed in the form of a questionnaire comprising of 29 questions. Four databases were evaluated by pre-registration pharmacists and both descriptive and inferential statistical analyses were performed with the results obtained. This report discusses the variations in quality aspects such as reliability, ease of use and content accuracy, between the databases evaluated.

INTRODUCTION

The narrow therapeutic ranges and inherently toxicity of anti-cancer drugs, (ACDs) make chemotherapy patients particularly susceptible to drug interactions (Scripture and Figg, 2006). Healthcare professionals have to keep themselves informed with the current developments involving these drugs. Online drug databases can be useful for this purpose as it provides an attractive venue for quick information dissemination. However, concerns exist over the wide variation quality of online health-related information (Sheehan et al., 2003).

To address this problem, several assessment tools to evaluate online health information have been developed with the aim of assisting users to sift through the plethora of online health information so as they can obtain good quality information. The following are some of the evaluation tools currently available: DARTS, DISCERN, eEUROPE, HONcode and Netscoring. Although these tools are useful for appraising health information websites, they are unable to evaluate the information accuracy. As such, there is no assessment tool that evaluates the quality and content accuracy of online ACD interaction information. A tool has therefore been developed to systematically evaluate the quality and content accuracy of online ACD interaction information.

METHODS

The definition of quality in this study has been defined as level of excellence which characterizes an online drug database in terms of its ability to satisfy drug interaction information needs (Provost et al., 2006).
Questionnaire Creation

An online quality evaluation tool was created on eSurveyspro (http://www.esurveyspro.com) in the form of a questionnaire containing 29 questions. Questions were separated into 2 sections: a) overall database quality and b) content accuracy. The content accuracy section assessed the effects, mechanism, evidence and management strategies of specific ACD interactions, while the overall database quality section assessed the reliability and the ease of use of the databases.

Content accuracy questions search databases for previously documented drug interactions between an antiepileptic drug (AED) and chemotherapy regimens. An AED was chosen because seizures often manifest in patients with brain tumors and brain metastases, in whom AEDs are often indicated (Yap et al., 2008). Information found on the databases was compared with in-house drug interaction profiles for accuracy verification.

The assessment tool was subsequently tested in a pilot study involving 8 second year undergraduate students from the Department of Pharmacy, National University of Singapore, to evaluate the user-friendliness of the questionnaire. Alterations were made according to the feedback received.

Database Selection and Evaluation

Online drug databases were searched for using Google on the 9th February 2009. From each search, the top 5 hits that provided direct links to freely accessible drug databases were considered. Three databases (Drugs.com, Medscape and DrugDigest) were eventually selected and evaluated. Micromedex® Healthcare Series was additionally included for evaluation given its prevalent use by healthcare professionals (Clauson et al., 2007). The tool was distributed to 20 pharmacists undergoing pre-registration training. A free movie voucher was offered as an incentive to complete the questionnaire. All incomplete responses for each database were not considered for analysis.

Statistical Analysis

Descriptive statistics for total and mean scores were computed. Friedman’s tests and Wilcoxon matched paired test were carried out as accordingly using the statistical software, ‘GraphPad Prism for Windows (Version 5)’, to check for statistically significant differences between the scores obtained by the databases for each evaluation domain. P values below 0.05 were considered statistically significant.

RESULTS AND DISCUSSION

An assessment tool for evaluating the quality of online ACD interaction databases has been developed in the form of an online questionnaire. This tool contains 29 questions separated into 2 sections – content accuracy (27 points) and overall quality (40 points). The first section of the tool assesses an online drug database’s content accuracy and the second section evaluates the overall quality. Questions in the second section are further subdivided into 2 domains – reliability (28 points) and ease of use(12 points).

A total of 6 viable responses were received from the 20 invitations sent (31% response rate). Table 1 displays the mean scores for individual domains of the questionnaire per database as well as the mean composite score for all databases.
Table 1. Mean domain and total scores obtained by the 4 evaluated databases

<table>
<thead>
<tr>
<th>Evaluated Databases</th>
<th>Mean Domain and Total Scores</th>
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<tbody>
<tr>
<td></td>
<td>Ease of use</td>
</tr>
<tr>
<td>Drugs.com</td>
<td>8.2</td>
</tr>
<tr>
<td>Medscape</td>
<td>8.0</td>
</tr>
<tr>
<td>DrugDigest</td>
<td>8.3</td>
</tr>
<tr>
<td>Micromedex</td>
<td>9.0</td>
</tr>
</tbody>
</table>

(a) Ease of Use
The scores for the ease of use domain were similar throughout the 4 databases, ranging between 66.7% and 75.0%. Pair wise comparisons revealed that the mean scores were not significantly different (p=0.65), although Micromedex did achieve the highest mean score of 9.0 (Table 1). This might be attributed to the greater familiarity respondents had with Micromedex as it is commonly used in Singaporean hospitals and institutions as a reference drug information database. Conversely, Medscape obtained the lowest mean score of 8.0. This could be attributed to the fact that Medscape required users to carry out an additional step in signing in into the database with a valid username and password, before being granted access to the drug interaction checker. This is not required of users for the other 2 free databases which were evaluated.

(b) Reliability
The scores revealed that Micromedex was deemed the most reliable, obtaining a mean score of 20.6 out of a maximum 28 and this was statistically significant (p=0.03) (Table 1). Interestingly, 2 respondents rated Drugs.com, with a higher score compared to Micromedex (22 versus 19 and 18 versus 14 for Drugs.com and Micromedex respectively). Perhaps this might be attributed to the presence of the HONcode seal of approval together with the sentence beside it stating that “we comply with the HONcode standard for trustworthy health information” (Drugs.com, 2009), which could have influenced the respondent’s decisions.

(c) Accuracy of Drug Interaction Information
Interestingly, all evaluated databases fared most poorly in this domain, where percentage scores ranged between 8.1% and 54.8%. The scores obtained were statistically different across the databases (p<0.01). All the databases were unable to detect the drug interaction between etoposide and valproic acid (Vecht, C.J. et al., 2003, Bourg V. et al., 2001). Medscape and DrugDigest were the 2 lowest scorers for accuracy. Medscape only managed to detect 1 out of the 3 drug interactions that were searched for, while DrugDigest detected none of interactions. Vorinostat was also not present in the list of drugs in DrugDigest.

Both Drugs.com and Micromedex detected 2 out of 3 interactions searched for. These were therefore deemed the more comprehensive databases, in terms of drug interaction detection. However, the information found on Micromedex was found to be more specific and detailed, as reflected in the higher mean scores obtained by Micromedex (Table 1). However, these scores were not statistically different when compared with each other (p=0.06), even though all respondents gave higher scores for Micromedex. This could indicate that the assessment tool was not sufficiently sensitive, particularly to slight variations in scoring.
(d) Total Scores

Total score comparisons revealed that Drugs.com (50.6%) was the highest scorer amongst the 3 free databases evaluated, edging Medscape (42.2%) and DrugDigest (35.9%) in both the reliability and content accuracy sections (Table 1). Although DrugDigest obtained a higher score than Drugs.com for the ease of use section, this difference was not statistically significant. Micromedex scored the highest in all evaluation domains and thus obtained the highest total score of 66.3%.

LIMITATIONS AND FUTURE WORK

The main limitation of this study was its small sample size. A possible reason for the poor response rate could be that the questionnaire took an average of 1 hour to complete. Evaluating online databases is a laborious task and evaluators were inevitably subject to fatigue beyond a certain threshold. This may have led to the subtle differences in the results obtained. In addition, the validity of this assessment tool had not been assessed although this is a common limitation of many assessment tools, possibly due to the lack of accepted validation standards available (Sheehan et al., 2003).

As with most online resources, the evaluated drug databases are dynamic entities which continuously undergo updating. Hence, the results obtained from this study are time-dependent and should be considered accordingly.

Further fine tuning of the assessment tool is necessary to render database assessments less laborious and this can possibly be achieved by assigning a fewer number of databases per evaluator. The amended questionnaire could subsequently be re-distributed to pharmacists for evaluation and respondent variability may then be analysed thereafter.

CONCLUSION

An assessment tool has been developed for evaluating the quality of online ACD interaction databases. This tool has been developed in an effort to increase the quality of ACD interaction information accessed by healthcare professionals or patients alike. The development of this tool also lays the groundwork for the long term evaluation of all online ACD interaction information.

REFERENCES