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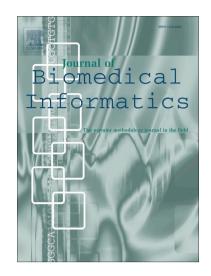
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Using visual analytics for presenting comparative information on new drugs

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Abstract

Objective: When a new drug is marketed, physicians must decide whether they will consider it for their future practice. However, information about new drugs can be biased or hard to find. In this work, our objective was to study whether visual analytics could be used for comparing drug properties such as contraindications and adverse effects, and whether this visual comparison can help physicians to forge their own well-founded opinions about a new drug.

Materials and Methods: First, an ontology for comparative drug information was designed, based on the expectations expressed during focus groups comprised of physicians. Second, a prototype of a visual drug comparator website was developed. It implements several visualization methods: rainbow boxes (a new technique for overlapping set visualization), dynamic tables, bar charts and icons. Third, the website was evaluated by 22 GPs for four new drugs. We recorded the general satisfaction, the physician's decision whether to consider the new drug for future prescription, both before and after consulting the website, and their arguments to justify their choice.

Results: The prototype website permits the visual comparison of up to 10 drugs, including efficacy, contraindications, interactions, adverse effects, prices, dosage regimens,... All physicians found that the website allowed them to forge a well-founded opinion on the four new drugs. The physicians changed their decision about using a new drug in their future practice in 29 cases (out of 88) after consulting the website.

Discussion and conclusion: Visual analytics is a promising approach for presenting drug information and for comparing drugs. The visual comparison of drug properties allows physicians to forge their opinions on drugs. Since drug properties are available in reference texts, reviewed by public health agencies, it could contribute to the independent of drug information.

Keywords: Visual analytics, Information visualization, Drug information, New drugs

1. Introduction

Pharmaceutical innovation sometimes leads to a major improvement of the treatment of a disease, despite the fact that many new drugs bring only slight improvements. The prescription of new drugs is also associated with a higher risk of serious adverse drug events and a higher number of hospitalizations [1, 2]. Moreover, new drugs are generally more expensive than those already in use [3, 4]. Consequently, it is important to adopt new drugs carefully by considering the most recent and independent information available. However, the adoption of new drugs by physicians is often not associated with their clinical interest [5]. It has been shown that non-clinical parameters, such as sex and age of the physicians, are associated with the early utilization of new drugs [6].

New drug prescriptions by GPs are sometimes influenced by patients or specialists, but not systematically [7]. GPs typically have in their mind a "shortlist" of the drugs they usually consider for prescription in a given indication, and, when prescribing, they choose a drug from their "shortlist" depending on the patient profile. Thus, when a new drug comes onto the market, GPs need information about the new drug's pros and cons relative to older drugs for the same indication, in order to decide whether they should consider the new drug for addition in their "shortlist".

Today, finding independent information on new drugs is difficult. Most of the available information either comes from the

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