

Osteoarthritis and Cartilage



International assessment on quality and content of internet information on osteoarthritis

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SUMMARY

Objective: Osteoarthritis is one of the leading causes of global disability. Numerous studies have assessed the quality and content of online health information; however, how information content varies between multiple countries remains unknown. The primary objective of this study was to examine how the quality and content of online health information on osteoarthritis compares on an international scale.

Methods: Internet searches for the equivalent of “knee osteoarthritis treatment” were performed in ten countries around the world. For each country, the first ten websites were evaluated using a custom scoring form examining: website type; quality and reliability using the DISCERN and Health-on-the-Net (HON) frameworks; and treatment content based on three international osteoarthritis treatment guidelines. Consistency of search results between countries speaking the same language was also assessed.

Results: Significant differences in all scoring metrics existed between countries speaking different languages. Western countries scored higher than more eastern countries, there were no differences between the United States and Mexico in any of the scoring metrics, and HON certified websites were of higher quality and reliability. Searches in different countries speaking the same language had at least 70% overlap.

Conclusions: The quality of online health information on knee osteoarthritis varies significantly between countries speaking different languages. Differential access to quality, accurate, and safe health information online may represent a novel but important health inequality. Future efforts are needed to translate online health resources into additional languages. In the interim, patients may seek websites that display the HON seal.

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Introduction

Internet access doubled from about 25% of the world's population in 2009, to over 50%, or 3.9 billion people, as of July 2017¹. The ability of the internet to provide patients with access to health information has been credited with revolutionizing medicine². In the United States, for example, over 70% of Americans use the internet to seek health related information³. High quality information is critical as patients may attempt to self-diagnose and/or

treat themselves, and inaccurate information can lead to patient harm^{4,5}.

Thousands of studies, including many in orthopaedics and rheumatology^{2,6–12}, have assessed the quality of internet-based health information. While most of these studies identified considerable variability in information quality, nearly all of them examined health content within a single language and country. Yet internet search results vary between countries¹³. Some countries even have firewalls and other forms of censorship that further alter sites available to internet users¹⁴. Given that differential information access can worsen social health inequalities (SHIs)¹⁵, the quality of online health information may represent an essential component in health equity on an international scale.

To our knowledge, no study has assessed the quality of internet health information on a given topic across a wide range of

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countries. The purpose of this study is to compare the quality of internet health information on knee OA treatment in representative countries from around the world. Knee OA is an ideal chronic disease to use for international study of online material because of its high prevalence^{16,17}, impact on healthcare costs and quality of life^{16,17}, and because standardized treatment guidelines exist to evaluate care^{18–20}. We hypothesized that information quality would be highly variable and that there would be significant differences in information content across countries.

Methods

Internet searches

We performed a search for the equivalent of “knee osteoarthritis treatment” in each included country. In order to maximize the generalizability of our results and the applicability to the greatest number of persons in the included countries, the term was searched in the language spoken by the most people in each country. The leading search engine in each country was used for the searches (Baidu in China, Yandex in Russia, Google for all other countries)²¹. We used the Google Chrome web browser incognito mode (Mountain View, CA, USA) on a server located in each respective country studied using two virtual private networking (VPN) services (HMA! Pro, London, UK and PureVPN, Hong Kong, China). The searches were performed in February 2017.

Shared language analysis

We first tested for similarity of search results between countries that speak the *same* language. The three most widely spoken languages spoken by greater than half the population of more than one country (Spanish, English, Arabic) were used for the searches. We also included French because of the large number of Francophone

nations, creating a total of four languages. All countries where each of the four languages is a national language were then pooled. From each pool, we selected the country with the most internet users as a benchmark, and then used a random number generator (www.google.com) to select four additional countries. For each of the four language pools, identical searches were performed in all five countries. The first ten URLs were recorded and we performed an analysis to determine the percent of results that were identical to the benchmark country.

Country and website selection

Next, we sorted the 201 countries for which internet access data were available²² by number of internet users for inclusion in the quality and content analysis. We selected the top ten countries based on total internet users, excluding countries where the primary language of the country overlapped with that of an already included country. Searches were thus performed in China (Chinese), India (Hindi), the United States (English), Brazil (Portuguese), Japan (Japanese), Russia (Russian), Germany (German), Mexico (Spanish), France (French), and Indonesia (Indonesian) (Fig. 1).

To accurately represent internet usage patterns, we included the first ten eligible results displayed by the search engine, as internet users rarely go beyond the first page of search results²³. Exclusion criteria consisted of PDF documents, multimedia (e.g., videos and PowerPoint presentations), and repeated URLs. We ignored any labeled advertisements that appeared anywhere on the search results page. Results for all languages were translated to English using Google Translate, which Google recently demonstrated to be indistinguishable from human translators in many cases using its new state of the art neural network translation technology²⁴. The neural network technology was available in English, French, German, Spanish, Portuguese, Mandarin, Japanese, Russian, and



Fig. 1. Locations of the servers where searches were performed. The blue cities were those included in the shared language analysis, while the black cities were included in the quality and reliability analysis.

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