

**RESEARCH LETTER**

# Communication of Drug Efficacy Information via a Popular Online Platform

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**Background:** Open-source online information channels have become increasingly important to the dissemination of medical information, including information about pharmaceuticals. We sought to determine the extent to which one prominent source of online information, Wikipedia, presented quantitative efficacy data about drugs.

**Methods:** Using the Drugs@FDA website, we identified all new drugs approved by the Food and Drug Administration (FDA) from 1982 to 2020 and their associated Wikipedia pages, and used dummy variables to code for the presence of efficacy data, safety data, and usage data.

**Results:** Approximately 98% of 1201 drugs approved from 1982 to 2020 had Wikipedia pages. While most pages provided indirect indicia of efficacy, such as indication (98%) or mechanism of action (86%), fewer (21%) quantified evidence of benefit. Wikipedia drug pages were associated with indicia of high impact, including a median of more than 23,000 annual page views.

**Conclusion:** Wikipedia is an important source of information that has the potential to shape public views about drug efficacy, but the absence of quantitative efficacy information in most pages limits public understanding of the benefits that drugs actually offer. (J Am Board Fam Med 2022;35:833–835.)

**Keywords:** Evidence-Based Medicine, Health Communication, Internet, Pharmaceutical Preparations

## Introduction

Despite the centrality of peer-reviewed literature to medicine, alternative channels for communicating drug information have risen dramatically in importance. By 2013, 94% of medical students<sup>1</sup> and nearly 50% of US physicians who went online for professional purposes used Wikipedia, and 72% of Americans with Internet access searched online for health information.<sup>2,3</sup> The Cochrane Collaboration considers Wikipedia an important means for disseminating evidence,<sup>4</sup> and a 2014 study by IMS Health (now IQVIA) found that

prescription volume was highly correlated with Wikipedia searches ( $R^2 = 0.87$ ).<sup>2</sup> Nevertheless, little is known about the extent to which Wikipedia discloses drug efficacy or safety information, or how frequently its drug pages are viewed.

## Objective

We examined the content and usage of Wikipedia drug pages to provide insight into their potential impact on public perception of the therapeutic value of drugs.

## Methods

Using the Drugs@FDA website, we identified all new drugs approved by the Food and Drug Administration (FDA) from 1982 to 2020 and

program on Addressing the Challenge and Constraints of Insulin Sources and Supply (ACCISS), Arnold Ventures, the Commonwealth Fund, the Greenwall Foundation, the Kaiser Permanente Institute for Health Policy, West Health, and under a Novo Nordisk Foundation grant for a scientifically independent Collaborative Research Programme (grant NNF17SA0027784).

**Conflict of interest:** None.

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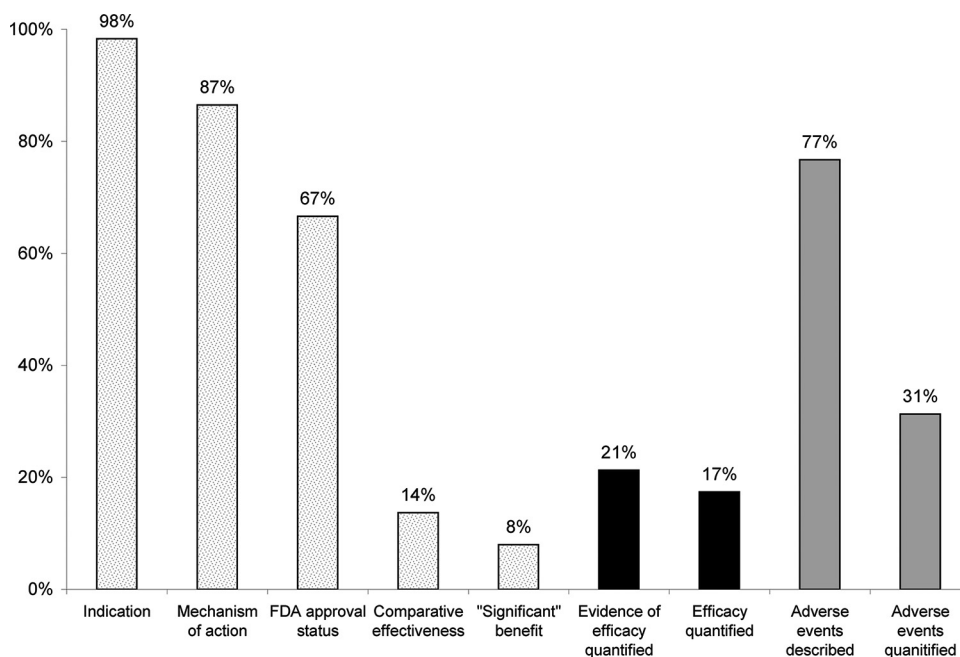
This article was externally peer reviewed.

Submitted 30 December 2021; revised 16 March 2022; accepted 25 March 2022.

From Program On Regulation, Therapeutics, And Law (PORTAL), Brigham and Women's Hospital and Harvard Medical School, Boston, MA, USA; Department of Law & Taxation, Bentley University, Waltham, MA, USA; and McCallum Graduate School of Business, Bentley University, Waltham, MA, USA.

**Funding:** This project was funded by a Bentley University Faculty Affairs Committee grant (grant number: not applicable). The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication. Dr. Darrow also receives research support from Health Action International's

**Figure 1. Frequency of benefit and risk information in wikipedia drug pages for drugs approved by the Food and Drug Administration (FDA), 1982 to 2020 (as of January 2021).**



Of 1201 drugs approved by the FDA from 1982–2020, 1169 had dedicated Wikipedia drug pages based on searches for each drug conducted during January 2021. The figure illustrates the share of those pages containing indicia suggestive of efficacy (light grey), quantification of efficacy or quantification of the evidence of efficacy (black), and descriptions or quantification of adverse events (dark grey). When a drug was associated with more than one dedicated Wikipedia page (n=10 drugs), the pages were considered together as a single page

their associated Wikipedia pages, which were downloaded in January 2021. From each page, we extracted indication, quantitative efficacy measures, comparative effectiveness claims, mechanism of action, FDA approval status, quantitative measures of evidence, mentions of adverse events, and quantitative measures of adverse events. We also extracted webpage views during calendar year 2020, and the number of page edits, editors, and Internet links from other webpages.

## Results

From 1982 to 2020, the FDA approved 1201 drugs. Of these, 1169 (97%) were associated with 1 Wikipedia page (Figure 1), and 10 (0.9%) with multiple pages. Most pages disclosed at least 1 indication (98%, 1149/1169), mechanism of action (86%, 1011/1169), and status as FDA-approved (67%, 779/1169). Other disclosures potentially related to perceptions of therapeutic value included comparative effectiveness information (14%, 160/1169), and the presence of “significant” benefit (8%, 93/1169). Just 21% (249/1169) quantified the evidence of benefit, and 17% (203/1169)

the magnitude of benefit. Seventy-seven percent (897/1169) mentioned at least 1 adverse event and 31% (366/1169) quantified the frequency of at least 1 adverse event.

Wikipedia drug pages had a median of 137 (interquartile range [IQR]: 70 to 268) edits, 68.5 (IQR: 38 to 133) editors, 285 (IQR: 125 to 508) links from other Wikipedia pages, 50 (IQR: 31 to 89) links from non-Wikipedia pages, and 23,829 (IQR: 9729 to 71,757) page views in 2020. The median share of edits made by the top 10% of editors was 40% (IQR: 30 to 53%).

## Discussion

Wikipedia has the potential to substantially influence public thought about drug efficacy. Nearly all (98%) drugs FDA-approved since 1982 were described in a dedicated Wikipedia page, and most (77%) drugs listed in the FDA’s Approved Drug Products with Therapeutic Equivalence Evaluations (Orange Book) were approved in 1990 or later.<sup>5</sup> Most Wikipedia drug pages have hundreds of links that lead to them, including from both external websites and other

Wikipedia pages, and receive tens of thousands of page views per year.

Pages nearly always contained indicia suggestive of meaningful therapeutic benefit, but quantitative measures of benefit (17%) or evidence of benefit (21%) were infrequent. Common indicia included: statements of indication (98%), suggesting medical consensus that a drug is sufficiently valuable to treat the indicated condition; mechanism of action (86%), offering a scientific rationale for how a drug achieves its effect; and FDA-approval status (67%), representing a formal endorsement by the government's expert drugs agency, despite the absence of any minimum net benefit threshold (other than nonzero) required for approval.<sup>6</sup> Collectively, these findings suggest that Wikipedia could contribute to perceptions of therapeutic value that may not be justified by objective measures. Practicing family physicians should therefore be prepared to correct any misimpressions by communicating the extent of benefit a drug is likely to offer before obtaining informed treatment consent from patients.

The dozens of editors associated with most Wikipedia drug pages suggest broad input that reflects the design of Wikipedia as a collaborative platform. However, the use of pseudonyms makes the identification of editors challenging, and it is possible that the use of proxy servers or other techniques could further obscure identities. Previous work has raised concerns about conflicts of interest, finding that some editors of Wikipedia drug pages seem to have ties to industry.<sup>7</sup> We found that a small number of editors often contributes a large share of edits, potentially magnifying the impact of any bias.

Given Wikipedia's collaborative nature and potential to influence perceptions of drug benefit, physicians and public health experts could improve public understanding by adding quantitative, unbiased, and scientifically-verified measures of efficacy to Wikipedia drug pages whenever they are able to do so, such as those provided within the FDA's approval documents.<sup>8</sup> In the longer term, a university-based organization could be established to assemble students of medicine or public health

in an ongoing effort to ensure that measures of therapeutic benefit described on Wikipedia drug pages are current, reliable, and clearly disclosed.

### Limitations

Only English-language Wikipedia pages were examined. Wikipedia's non-English language drug pages may substantially enlarge the impact of Wikipedia, and may not present the same information as their English-language counterparts. Median numbers of links, edits, and editors per page were not adjusted for the differing durations since approval.

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The authors thank Aaron Kesselheim for helpful comments.

To see this article online, please go to: <http://jabfm.org/content/35/4/833.full>.

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