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 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. The Cochrane Collaboration considers Wikipedia an important means for disseminating evidence, and a 2014 study by IMS Health (now IQVIA) found that prescription volume was highly correlated with Wikipedia searches ($R^2 = 0.87$). 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...
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. Most Wikipedia drug pages have hundreds of links that lead to them, including from both external websites and other

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).
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. 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.7 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.8 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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