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## Quantitative Information on Oncology Prescription Drug Websites

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### Abstract

Our objective was to determine whether and how quantitative information about drug benefits and risks is presented to consumers and healthcare professionals on cancer-related prescription drug websites. We analyzed the content of 65 active cancer-related prescription drug websites. We assessed the inclusion and presentation of quantitative information for two audiences (consumers and healthcare professionals) and two types of information (drug benefits and risks). Websites were equally likely to present quantitative information for benefits (96.9%) and risks (95.4%). However, the amount of the information differed significantly: Both consumer-directed and healthcare-professional-directed webpages were more likely to have quantitative information for every benefit (consumer: 38.5%; healthcare professional: 86.1%) compared with every risk (consumer: 3.1%; healthcare professional: 6.2%). The numeric and graphic presentations also differed by audience and information type. Consumers have access to quantitative information about oncology drugs and, in particular, about the benefits of these drugs. Research has shown that using quantitative information to communicate treatment benefits and risks can increase patients' and physicians' understanding and can aid in treatment decision making, although some numeric and graphic formats are more useful than others.

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Marketing prescription drugs to consumers and healthcare professionals is prevalent in oncology. One study found that 86% of cancer patients surveyed were exposed to direct-to-consumer (DTC) promotion for oncology drugs, with 17% reporting that they talked to their healthcare professional about an advertised drug [1]. In another study, 94% of oncology nurses reported having a patient who asked about an advertised drug [2]. Prescription drug promotion to healthcare professionals in oncology is also widespread [3]. However, there are concerns about its quality and impact on prescribing [4].

One suggestion for improving quality in prescription drug promotion is to include quantitative information about drug benefits and risks [5-6]. Studies have shown that adding quantitative information in DTC advertising improves consumer understanding [7]. For instance, when drug efficacy claims are presented without quantitative information, consumers can be misled into thinking the drug works better than it does [8]. At the same time, some quantitative information presentations are more useful than others. For example,

including graphs, percentages, frequencies, and absolute but not relative risks can improve understanding [9-11].

Our objective was to examine how quantitative information is used to communicate drug benefits and risks on cancer-related prescription drug websites.

## Methods

We identified 167 cancer-related prescription drugs using MediLexicon, of which 115 had websites. To be included, the website had to be: fully-functional, for an approved cancer-related indication of an available branded prescription drug regulated by the Center for Drug Evaluation and Research at FDA, and contain webpages for both consumers and healthcare professionals. This resulted in a final sample of 65 websites. Two raters independently coded the websites for the amount and type of quantitative information (percent agreement = 93-98%; kappa = 0.62-0.99). Discrepancies were resolved between raters. We report descriptive statistics and McNemar nonparametric test results.

## Results

Of the prescription drugs in the sample, 88% ( $n = 57$ ) were oncology treatments and 12% ( $n = 8$ ) were indicated for treatment of oncology-related side effects, such as nausea. Treatments for several types of cancer were represented in the sample; the most frequent were breast cancer ( $n = 15$ ; 23%), leukemia ( $n = 11$ ; 17%), and lymphoma ( $n = 9$ ; 14%).

The majority of consumer-directed webpages included quantitative information (Table 1). These webpages were equally likely to present quantitative information for benefits and risks,  $P = 0.21$ , but they were more likely to have quantitative information for *every* benefit compared with *every* risk,  $P < 0.001$ . They used formats such as frequencies, probabilities, and medians. They were more likely to present relative risks,  $P < 0.001$ , and medians,  $P = 0.002$ , for benefits than for risks. Most consumer-directed webpages did not present multiple frequencies for benefits or risks, and when they did most did not use the same denominator across frequencies. Among webpages that presented multiple frequencies, the percentage that used the same denominator across frequencies was 10% (1/10) when presenting benefits and 0% (0/1) when presenting risks. Bar charts and tables were the most common graphs. Consumer-directed webpages were more likely to present bar graphs and use text descriptors (e.g., “majority”) for benefits than for risks,  $P = 0.01$ .

Almost all healthcare professional-directed webpages included quantitative information (Table 1). These webpages were equally likely to present quantitative information for benefits and risks,  $P = 1.0$ , but they were more likely to have quantitative information for *every* benefit compared with *every* risk,  $P < 0.001$ . They presented a range of numerical formats, from frequencies and probabilities to more advanced statistics. They were more likely to present relative risks, Kaplan-Meier curves, means, medians, ratios,  $P$ -values, and confidence intervals or standard errors/deviations for benefits than for risks,  $P = 0.04$  for means and  $P < 0.001$  for all other comparisons. They were *less* likely to present frequencies for benefits than for risks,  $P = 0.01$ , in particular in the “N out of X” format,  $P = .001$ . Most webpages did not present multiple frequencies for benefits or risks, and when they did most

did not use the same denominator across frequencies. Among webpages that presented multiple frequencies, the percentage that used the same denominator across frequencies was 0% (0/4) when presenting benefits and 20% (1/5) when presenting risks. Most healthcare professional-directed webpages presented graphs; bar charts, tables, and line graphs were the most common. These webpages were more likely to present bar graphs,  $P=0.001$ , line graphs,  $P=0.001$ , and “other” graphs,  $P=0.004$ , for benefits than for risks. They were *less* likely to present tables for benefits than for risks,  $P=0.001$ .

## Discussion

In a content analysis of 65 cancer-related prescription drug websites, we found that all but one included quantitative information. When limited to webpages directed to consumers, 72% included quantitative information. This amount is higher than the amount of quantitative information found in previous research for other drug classes and for cancer-related print ads [12-14]. Prescription drug sponsors may expect oncology patients and their healthcare professionals to be engaged in more thorough discussions of the tradeoff between drug benefits and risks and therefore may present more concrete, quantitative information about these benefits and risks. In addition, websites allow more information to be presented than print ads.

Even though the amount of quantitative information was high, the amount of information differed when presenting benefit and risk information. These differences may reflect promotional decisions or they may reflect how data are presented in the drug labeling. Best practices in communication suggest that numeric formats that are most commonly understood by consumers and healthcare professionals should be used and that more complicated formats should be avoided [9-11]. In accordance with these recommendations, quantitative information presented on consumer and healthcare professional webpages was often presented as frequencies and percentages which have been found to be more easily understood by both populations. However, consumer and healthcare professional webpages were more likely to present relative risks for benefits than for risks. Because relative risks can cause individuals to overestimate effects [11], this may lead consumers and healthcare professionals to overestimate the benefits of the drug.

A limitation of a content analysis is that it cannot tell us how many consumers and healthcare professionals are exposed to the information on cancer-related prescription drug websites or how they interpret and use the information. It is important to note that there are socioeconomic and racial disparities in Internet access that may determine who has access to this quantitative information about cancer-related prescription drugs [15]. More research is needed on consumer and healthcare professional exposure to prescription drug promotion containing quantitative information and the impact it has on their decision-making.

Oncology patients have access to a large amount of quantitative information about prescription oncology drugs from consumer and healthcare professional webpages. Although more of this information appears on webpages targeted to healthcare professionals, patients are able to access these webpages as well. The availability of quantitative information may help patients learn about treatment options and may lead to informed

discussions between healthcare professionals and patients. Healthcare professionals should be aware that the difference in how benefits and risks are presented could affect patients' perspectives, and they should be prepared to discuss this information as part of the decision-making process.

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Number and Percentage of Websites with Quantitative Information by Audience and Information Type (N = 65)

Table 1

	Website included	Example	Consumer				Healthcare Professional			
			Benefit		Risk		Benefit		Risk	
			No.	%	No.	%	No.	%	No.	%
Quantitative information	39	60.0	32	49.2	62	95.4	62	95.4	62	95.4
Every benefit/risk	25	38.5	2	3.1	56	86.1	4	6.2	4	6.2
Some benefits/risks	14	21.5	30	46.2	6	9.2	58	89.2	6	9.2
Frequency	10	15.4	5	7.7	6	9.2	16	24.6	6	9.2
1 out of X format	5	7.7	3	4.6	1	1.5	3	4.6	1	1.5
N out of X format	6	9.2	3	4.6	5	7.7	15	23.1	5	7.7
Probabilities	37	56.9	31	47.7	62	95.4	61	93.8	62	95.4
Percentages	34	52.3	31	47.7	62	95.4	61	93.8	62	95.4
Absolute risk reduction	4	6.2	0	0	3	4.6	1	1.5	3	4.6
Relative risk/relative risk reduction	19	29.2	0	0	37	56.9	2	3.1	37	56.9
Number needed to treat	0	0	0	0	0	0	0	0	0	0
Kaplan-Meier curve y-axis	0	0	0	0	16	24.6	0	0	16	24.6
Mean	5	7.7	0	0	10	15.4	3	4.6	10	15.4
Median	13	20.0	1	1.5	46	70.8	7	10.8	46	70.8
Ratio (e.g., hazard, odds)	1	1.5	0	0	40	61.5	0	0	40	61.5
P-value	1	1.5	0	0	40	61.5	0	0	40	61.5
Confidence interval (CI), standard error, or standard deviation	1	1.5	0	0	45	69.2	1	1.5	45	69.2
Other quantitative information	4	6.2	0	0	0	0	4	6.2	0	0
Text descriptors	12	18.5	2	3.1	19	29.2	9	13.8	19	29.2
Bar graph	10	15.4	1	1.5	44	67.7	13	20.0	44	67.7
Pie chart	0	0	0	0	0	0	0	0	0	0
Line graph	1	1.5	0	0	50	76.9	4	6.2	50	76.9
Pictograph or icon array	5	7.7	0	0	3	4.6	1	1.5	3	4.6

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	Consumer				Healthcare Professional			
	Benefit		Risk		Benefit		Risk	
	No.	%	No.	%	No.	%	No.	%
Website included								
Table	4	6.2	8	12.3	22	33.8	53	81.5
Other graph	3	4.6	0	0	9	13.8	0	0

Note. This table presents whether there was quantitative information about benefits (risks) presented for every benefit (risk) or some of the benefits (risks).