

PURE Award Final Report

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Supervisor Signature:

Background

Canada will soon be the second nation in the world to legalize cannabis, both medically and recreationally, and will be the first of the G7 countries to do so. With these impending changes to cannabis law and how cannabis can be accessed, it is important health care providers (HCPs) understand why patients believe they will benefit from cannabis use, particularly in those who have a history of childhood cancer. In this younger demographic, there is substantial concern regarding the unknown side-effects of cannabis use on long-term growth, and it is key HCPs understand external literature being provided to patients. This information may come from online sources, another HCP, or family and friends of the patient. The wide variance in reliability and quality of online literature, increasing concern women and children are becoming less weary to potential risks of cannabis, and rapidly changing laws in Canada and the United States (US) necessitate the conduction of a study delving deeper into what patients and their families are being told. This review is a part of a larger study regarding why attitudes are changing.

Specific aims of the study were to identify the type of literature (e.g. blog, government document, academic article) available to potential users of cannabis, the quality of the literature (Is it verifiable? Peer reviewed? etc), common themes in the available literature and the sentiment of online content. We hypothesized article quality would be low, the majority of articles would be news or online articles, and sentiment would be pro-cannabis. Thematically, we expected results would focus on the reasons one should choose to use cannabis, and specific symptoms cannabis can alleviate.

Methods

Data Sources and Searches

Searches were conducted using three, primary search engines: Google, Yahoo, and DuckDuckGo, using the respective “private browsing” modes for Google and Yahoo. Private browsing modes were used to avoid results being altered by previous searches; ensuring results were as generalizable as possible. Private browsing modes operate by preventing browsers from tracking results and integrating them into

search algorithms. DuckDuckGo is a unique search engine as results are not tracked, negating the need for a private browsing mode, and because the operator recognizes Boolean search operators. Searches were conducted using four strings of search terms in each search engine. They are as follows: Marijuana AND Childhood AND Cancer, Pot AND Childhood AND Cancer, Marijuana AND Pediatric AND Cancer, Pot AND Pediatric AND Cancer. The results from the first two pages of results were taken, scanned for eligibility based on inclusion/exclusion criteria, and recorded by link, date of the search, and search engine. Articles were further examined at this stage for whether they discussed both cannabis and pediatric cancer. Line-by-line coding was used to determine both the sentiment and themes within articles. NVivo Software (version 12) was used to group codes and identify clusters. For quality analysis, a scale was adapted from the Milstein Undergraduate Library, and was rated by two raters. All disagreements for sentiment and theme were resolved via consensus. For quality, scores were similar, and an intraclass coefficient was used to determine consistency. Numerical scores were broken down into “very poor,” “poor,” “acceptable,” “good,” and “excellent.” Sentiment was either pro-cannabis, with more than 60% of statements supporting cannabis use, anti-cannabis, with less than 40% of statements supporting cannabis use, or mixed, with statements supporting use between 40% and 60% of all identified statements for a given article.

Results

In total, the search yielded 213 articles. 151 articles were repeated within the search terms and across search engines, leading to 62 unique articles. 9 of these articles were excluded. Reasons for exclusion included not discussing cannabis and pediatric cancer (n=5), being older than a 2007 publish date (n=2), being a repeat of an already published article with a redirect to that article (n=1), and for having a length (156 pages) determined to exceed what a patient or parent would be willing to read (n=1). This left 53 articles eligible for review. Post-quality-review, two additional articles were excluded from thematic and sentiment analysis due to being duplicates of previous articles, but from different information providers.

Quality Assessment

Interrater reliability of the quality assessment using an intraclass correlation coefficient was 0.988, indicating a strong correlation between the total scores of the two raters. The coefficients for individual categories can be viewed in Figure 2. Articles fell into one of the following classifications: web article with no news affiliation (n=14), news article (n=21), magazine article (n=3), government-produced article (n=3), hospital-produced article (n=2), academic article (n=5) and blogs (n=5) (both personal and those associated with an organization). The classifications of most articles were news (38.9%) and web articles (25.9%). With respect to the third objective, the quality of articles were rated very poor (n=2), poor (n=9), acceptable (n=18), good (n=14), or excellent (n=10). Article quality was acceptable overall, but of wide variance.

The majority of articles were deemed to be satisfactory in nature, typically being written by journalists with limited experience in health-related fields, with verifiable and consistent sources, but not necessarily peer-reviewed and academic in nature. Publishers were reputable but often known to cater to a specific audience (i.e. anti-institution), possibly creating bias.

Thematic Analysis

Analyses of coded content tended to focus around four central themes: why individuals should or should not use cannabis, the opinion of HCPs, the restrictions placed by governing bodies, and additional research, education and standardization was needed. The aforementioned themes were agreed upon after examining the total number of codes identified per category.

Within these themes, 26 articles discussed reasons not to use cannabis, with the majority of these articles citing concerns surrounding abuse and developmental delay potential, especially for children. Of articles supporting the use of cannabis, the majority supported use for alleviating an effect of chemotherapy or associated medications. Reasons for use of cannabis were primarily nausea (n=25), pain (n=17), vomiting (n=19), or psychosocial issues (n=17), such as anxiety. Associated with these findings

were articles mentioning traditional therapies and medications used by children to be ineffective or not effective enough. The voice of one child was portrayed in one article stating: “chemo actually has healed a lot of kids, but it almost killed me”. These sources typically went on to discuss how cannabis had curative properties for cancer despite a lack of clinical evidence of success. Under the theme “opinion of HCPs,” the majority of articles discussed an article recently published which concluded the majority of American oncologists would be willing to prescribe medical cannabis to pediatric patients. We suspect that the high frequency of this article appearing may be related to a recency bias within the search engine algorithm. Due to the private nature of algorithms, we cannot confirm this hypothesis. Under the theme of “governing body restriction,” articles either discussed the position of the American Academy of Pediatrics, reiterating that cannabis was discouraged from use in children, or that cannabis is illegal in the United States, prohibiting prescription, research, and access. We found little concern surrounding legality in Canada, as physicians in Canada are able to prescribe the drug to children without legal ramifications. Finally, under the theme “research, education, and standardization, many articles, particularly those of high-quality highlight a need for “further clinical research to determine efficacy and correct dosage for cannabinoids” as well as education and standardization. Frequently noted was the urgency of additional research, as once a definitive answer on the efficacy of cannabis can be reached, then education and standardization can follow. Physicians interviewed within articles frequently re-iterated legislation and lack of evidence surrounding cannabis as a primary reason for not recommending its use at present. Many physicians were open to the possibility cannabis would be viable in the future, pending additional clinical trials.

Unfortunately, the current status of the drug in the US prevents clinical trials from being conducted and from a definitive answer being reached. A large majority of articles, both high and low quality, indicated clinical literature and experimentation is lacking. Providers must be cognizant of this lack of literature, and need to convey this to patients who are considering using medical cannabis as a

therapy. Conclusive literature does not exist to support or detract from cannabis as a therapy, with conflicting trials from both sides.

Sentiment Analysis

In examining the fourth objective, sentiment was coded by two raters to ensure consistency. Kappa scores were calculated from the interrater review. For positive sentiment detection, $k=0.718$. For negative sentiment detection, $k=0.705$. Overall ratings matched, as all disagreements at this level were clarified. Articles were overwhelmingly positive or mixed, with 46 articles falling under this category. 5 articles were found to be anti-cannabis, or negative in sentiment, 19 articles were found to be mixed, or of neutral sentiment, and 27 articles were found to be pro-cannabis, or of positive sentiment.

What I gained:

Through the project and exposure to other projects related to the future focus-group phase, I was able to understand and apply new techniques for qualitative data collection, including automated methods of conducting literature reviews, applying non-biased psychological tests, and writing a formal research paper for a systematic review. Throughout the project, I was also able to develop experience in creating new methods of analysis due to the lack of previous online literature reviews. The multidisciplinary scope of the research has also given me the chance to network with other experts in the oncology field, and I have gained an important appreciation for the link between clinical observations and research.

My summer research experience has also led to the creation of a report for publication in Pediatric Blood and Cancer in the future, and may lead to additional publications once focus groups are complete.

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