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Social media engagement of supportive care publications in oncology

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ABSTRACT

Importance: There is an increasing number of cancer ‘survivors’ and increasing research into supportive care. However, it is unknown how patterns of attention and citation differ between supportive and non-supportive cancer care research. We sought to estimate the engagement of high-impact studies of supportive compared to non-supportive cancer care papers.

Methods: In a cross-sectional review of top oncology journals (2016–2023), we reviewed studies examining supportive care strategies and a frequency-matched random sampling of studies on non-supportive interventions. We compared data on social engagement metrics, as represented by Altmetric scores and citations and funding status, by supportive care or non-supportive care articles.

Results: We found overall Altmetric scores were no different between articles that did not test supportive care and those that did, with a numerically higher score for supportive care articles (86.0 vs 102; $p=0.416$). Other bibliometric statistics (such as the number of blogs, number of X users, and the number of X posts) obtained from Altmetric did not differ significantly between the two groups. Non-supportive cancer care papers had a significantly higher number of citations than supportive cancer care papers (45.6 in supportive care vs 141 in non-supportive care papers; $p<0.001$). A greater proportion of non-supportive cancer care papers were also supported by pharmaceutical companies compared to supportive cancer care papers (54.2% vs 15.3%; $p<0.001$).

Conclusion: Though social media engagement is similar between supportive and non-supportive cancer care papers in high-impact journals, there is a significant difference in support from pharmaceutical companies and the number of citations.

1. Introduction

There is widespread enthusiasm in cancer medicine for new drugs and cellular therapies, evidenced by large research and development outlays in the biopharmaceutical sector and over 300 new drugs approved by the US FDA over the last two decades [1]. At the same time, it is unclear if similar enthusiasm exists for cancer research on supportive or palliative care. In fact, a viral social media post in late 2023 showed photos from a major oncologic conference where overflowing aisles were present for developmental therapeutic research but there was notable absence of interest for supportive care research endeavors [2].

The topic of supportive care is multi-disciplinary and broad, including domains of cancer care in rehabilitation, secondary prevention, survivorship, and end-of-life care [1]. Considering an increasing

number of cancer “survivors” in the population, better therapies that prolong life in the metastatic setting and an increasingly aging population being at-risk for developing cancer, interest in supportive care research should be a priority, and yet, it is unknown how much attention and recognition research on this topic receives in social media and/or in the peer-reviewed literature [3].

Although many anecdotally perceive supportive care research in oncology to be of lower priority and receiving less attention than research on drugs, there is no empirical analysis of this question. To that end, we compiled a set of high impact papers on novel therapeutics and supportive care in oncology. We queried metrics of interest, including Altmetric scores, blog and media coverage, and citations in the peer-reviewed literature.

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2. Methods

We sought to assess the attention impact of studies assessing supportive care in oncology and that have been published in the leading oncology journals based on impact factor. By focusing on articles in top journals, we aimed to assess the impact of articles that are widely important and relevant to the field, based on the perception of esteemed editors and reviewers. In selecting relevant articles, all trials, comparative studies, and observational studies published in JAMA Oncology, Lancet Oncology, Journal of Clinical Oncology (JCO) and Annals of Oncology between 2016 and 2023 were potentially eligible. Our PubMed search was in December 2023.

The search strategy designed is outlined in Appendix 1. From the list of eligible studies, we noted whether they evaluated a supportive care intervention or not. We defined supportive care as those that do not directly address the cancer, but aid in the management and/or prevention of adverse effects of the cancer itself (such as the symptoms) or the treatment for the cancer. We included original research that evaluated the effectiveness of a supportive care intervention (including those managing mental health distress), and we excluded review articles, including systematic reviews and meta-analyses, on supportive care or that did not test a supportive care intervention (e.g., anti-tumor drugs). From those that did not have the topic of supportive care in cancer, we selected an equal number of papers from the same list of studies to serve as a comparison group. These were randomly selected by assigning each article a randomly generated number and selecting the articles with the lowest number first.

From the included supportive and non-supportive cancer care papers, the following information was then extracted: whether the study received support or funding from pharmaceutical companies, government, and charities or foundations, the type of intervention studied in the trial (radiation, drug, practice, supplement, others), the number of patients in the trial and control arms of the trial, phase of the trial, tumor type, and outcome of the trial for the primary outcome or endpoint (positive, no difference/ negative). For trials on supportive cancer care only, we also extracted information on the symptoms that are addressed in the trial (dysphagia, nausea, vomiting, quality of life, inflammation, infection). For trials on non-supportive cancer care only, we extracted the endpoints of interest.

We also collected information on the overall Altmetric score, overall Altmetric percentile, and Altmetric percentile among papers in that particular journal, number of news outlets and/or blogs that discussed the paper, the number of news and blog stories that publicized the paper, the number of X users and X posts that mentioned the paper, the number of citations the paper had received, and the number of facebook pages that mentioned the paper. All of the above mentioned information was obtained from the Altmetric software on 28 February 2024. The overall Altmetric score is an indicator of the impact of a paper and is a weighted metric that combines the mentions of a paper on social media platforms such as X, Facebook, blogs, news outlets, and policy sources. The overall Altmetric percentile is a measure of how the paper ranks against all the other papers tracked by Altmetric. The Altmetric percentile among papers in that particular journal is an indicator of how a paper performs against all papers tracked by Altmetric published in that particular journal.

We reported descriptive characteristics for all included trials, categorized as supportive or non-supportive care in cancer. We used a chi-square test to determine differences between the various variables in trials on supportive care for cancer compared to that on non-supportive care for cancer. We used R statistical software, version 4.2.3, and Microsoft Excel for all statistical analyses.

In accordance with 45 CFR §46.102(f), this study was not submitted for University of California, San Francisco institutional review board approval because it involved publicly available data and did not involve individual patient data.

3. Results

Between 2016 and 2023, 59 supportive care in oncology studies were collectively published in JAMA Oncology, Lancet Oncology, JCO, and Annals of Oncology. 59 trials on non-supportive cancer care with the same journal distribution (18 from JAMA Oncology, 7 from Lancet Oncology, 27 from JCO, and 7 from Annals of Oncology) were randomly identified.

The characteristics of all 118 trials, stratified by supportive cancer and non-supportive cancer care, are listed in [Table 1](#).

Among the supportive cancer care trials, there was a large variety of symptoms that are targeted by interventions ([Table 2](#)). The four most common symptoms targeted include quality of life, nausea/ vomiting, infection/ inflammation, and pain.

Studies evaluating non-supportive cancer care were more likely to receive funding from pharmaceutical companies than those evaluating supportive cancer care (54.2 % vs 15.3 %; $p < 0.001$; [Table 1](#)) and had a higher number of mean citations in the peer-reviewed literature (141.0 vs 45.6; $p < 0.001$; [Table 1](#)). There were no differences in the phase of the trials (39.0 % vs 20.3 % in Phase 2; $p = 0.074$; [Table 1](#)). There were no significant differences in support from government (49.2 % vs 61.0 %; $p = 0.177$; [Table 1](#)), support from non-profit and/or foundation organizations (22.0 % vs 25.4 %; $p = 0.746$; [Table 1](#)), intervention type, (59.3 % vs 39.0 % that were drugs; $p = 0.0586$; [Table 1](#)), or the number of patients included in the trial and control arms.

3.1. Measures of interest

We found overall Altmetric scores were no different between articles that did not test supportive care and those that did, with a numerically higher score for supportive care articles (86.0 vs 102.0; $p = 0.416$). We found a significant difference in the number of citations between supportive and non-supportive cancer care papers (45.6 in supportive care vs 141.0 in non-supportive care papers; $p < 0.001$). Yet, other bibliometric statistics (such as the number of blogs, number of X users and the number of X posts) obtained from Altmetric did not differ significantly between the two groups of papers ($p > 0.05$; [Table 1](#)).

4. Discussion

Ours is the first study to quantitatively measure and compare the online engagement of supportive care research publications to non-supportive research publications in four leading oncology journals. From 2016 to 2023, a total of 59 trials evaluating supportive care interventions were published in these journals.

In comparing a randomly selected matched set of non-supportive care publications to those examining supportive care therapies, there was no statistically significant difference in Altmetric score, suggesting that there is no difference in online engagement by stakeholders such as oncologists, researchers, sponsors, and the public between these studies. This is bolstered by a lack of difference in blog coverage, and activity on social media platforms (e.g. X, Facebook, or blogs), meaning that research articles were shared regardless of being focused on supportive care or non-supportive care. It is unclear whether the lack of differences in Altmetric scores between these two categories of research in oncology can be attributed to a lack of real-world differences in the interest of different types of therapies, or whether the Altmetric scores are indicators of journal activity at-large for the leading journals in oncology. Questionnaire and qualitative studies to understand interest and prioritization of research publications by oncologists and researchers may help provide further clarification.

We did find a difference in early citation patterns. Whether this will persist with continued follow up is uncertain. Supportive care articles receive fewer citations than comparable articles in high impact journals. Thus, our results show a juxtaposition between interest from the broader cancer community and the researcher workforce contributing to the

Table 1
Characteristics of studies evaluating supportive and non-supportive cancer care in top oncology journals (2016–2023).

	Non-supportive (N=59)	Supportive (N=59)	P-value
Location - US			
No	28 (47.5 %)	31 (52.5 %)	0.78
Yes	30 (50.8 %)	28 (47.5 %)	
Missing	1 (1.7 %)	0 (0.0 %)	
Pharma Funding			
No	26 (44.1 %)	47 (79.7 %)	<0.001
Yes	32 (54.2 %)	9 (15.3 %)	
Missing	1 (1.7 %)	3 (5.1 %)	
Non-profit Funding			
No	45 (76.3 %)	41 (69.5 %)	0.75
Yes	13 (22.0 %)	15 (25.4 %)	
Missing	1 (1.7 %)	3 (5.1 %)	
Government Funding			
No	29 (49.2 %)	20 (33.9 %)	0.18
Yes	29 (49.2 %)	36 (61.0 %)	
Missing	1 (1.7 %)	3 (5.1 %)	
Altmetric Overall			
Mean (SD)	86.0 (81.7)	102.0 (131.6)	0.42
Median [Min, Max]	65.0 [1.0, 428.0]	63 [13.0, 925.0]	1.00
Missing	2 (3.4 %)	0 (0.0 %)	
Altmetric Overall Percent			
Mean (SD)	6.0 (3.6)	6.7 (4.0)	0.33
Median [Min, Max]	5.0 [5.0, 25.0]	5.0 [5.0, 25.0]	0.11
Missing	2 (3.4 %)	0 (0.0 %)	
Altmetric Journal Percent			
Mean (SD)	82.1 (18.4)	85.8 (13.5)	0.20
Median [Min, Max]	88.0 [3.0, 99.0]	89.0 [31.0, 99.0]	0.56
Missing	2 (3.4 %)	0 (0.0 %)	
Intervention Type			
Chemoradiation	1 (1.7 %)	0 (0.0 %)	0.06
Drug	35 (59.3 %)	23 (39.0 %)	
Practice	18 (30.5 %)	28 (47.5 %)	
Radiation	4 (6.8 %)	4 (6.8 %)	
Radioimmunotherapy	1 (1.7 %)	0 (0.0 %)	
Supplement	0 (0.0 %)	4 (6.8 %)	
Number of Patients (Control Arm)			
Mean (SD)	780.0 (2890.0)	130.0 (147.0)	0.17
Median [Min, Max]	194.0 [30.0, 18000.0]	79.0 [0.0, 901.0]	0.005
Missing	21 (35.6 %)	0 (0.0 %)	
Number of Patients (Intervention Arm)			
Mean (SD)	346.0 (831.0)	195.0 (182.0)	0.18
Median [Min, Max]	127.0 [20.0, 6120.0]	149.0 [15.0, 795.0]	0.85
Phase			
1	6 (10.2 %)	0 (0.0 %)	0.07
2	23 (39.0 %)	12 (20.3 %)	
3	25 (42.4 %)	24 (40.7 %)	
4	1 (1.7 %)	2 (3.4 %)	
Missing	4 (6.8 %)	21 (35.6 %)	
Outcome Group			
No difference/ Negative	16 (27.1 %)	12 (20.3 %)	0.55
Positive	43 (72.9 %)	46 (78.0 %)	
Number of News Outlets			
Mean (SD)	6.2 (8.98)	8.3 (17.6)	0.40
Median [Min, Max]	3.0 [0.0, 48.0]	3.0 [0.0, 116]	1.00
Number of News Stories			
Mean (SD)	7.9 (12.8)	9.4 (20.1)	0.63
Median [Min, Max]	4.0 [0.0, 71.0]	4.0 [0.0, 136.0]	1.00
Missing	1 (1.7 %)	0 (0 %)	
Stories on Blogs			
Mean (SD)	0.72 (0.95)	0.92 (1.4)	0.39
Median [Min, Max]	0.0 [0.0, 3.0]	0.0 [0.0, 7.00]	1.00
Missing	1 (1.7 %)	0 (0.0 %)	
Blogs			
Mean (SD)	0.6 (0.8)	0.8 (1.2)	0.22
Median [Min, Max]	0 [0.0, 3.0]	0 [0.0, 5.0]	1.00
Missing	1 (1.7 %)	0 (0.0 %)	

Table 1 (continued)

	Non-supportive (N=59)	Supportive (N=59)	P-value
Posts on X			
Mean (SD)	78.7 (66.8)	98.4 (88.4)	0.18
Median [Min, Max]	66.5 [1.0, 389.0]	68.0 [2.0, 401.0]	0.93
Missing	1 (1.7 %)	0 (0.0 %)	
Users on X			
Mean (SD)	63.6 (51.0)	79.8 (67.0)	0.14
Median [Min, Max]	52.0 [1.0, 290.0]	58.0 [2.0, 273.0]	0.64
Missing	1 (1.7 %)	0 (0.0 %)	
Citations			
Mean (SD)	141.0 (186.0)	45.6 (41.6)	<0.001
Median [Min, Max]	72.0 [5.0, 810.0]	30.0 [1.0, 218.0]	<0.001
Missing	1 (1.7 %)	0 (0.0 %)	
Facebook posts			
Mean (SD)	0.4 (0.6)	0.6 (1.1)	0.27
Median [Min, Max]	0 [0.0, 2.0]	0 [0.0, 6.0]	0.60
Missing	1 (1.7 %)	0 (0.0 %)	

Table 2
Common symptoms addressed in studies on supportive cancer care in top oncology journals (2016–2023).

	Overall (N=70)
Outcome Type	
Fatigue	4 (5.7 %)
Infection/ Inflammation	6 (8.6 %)
Lymphedema	1 (1.4 %)
Nausea/ Vomiting	6 (8.6 %)
Neutropenia	4 (5.7 %)
Not specified	5 (7.1 %)
Nutrition	3 (4.3 %)
Other	7 (10.0 %)
Pain	5 (7.1 %)
Psychological	4 (5.7 %)
Quality of life	6 (8.6 %)
Skin-related	3 (4.3 %)
Sleep	1 (1.4 %)
Shortness of breath	2 (2.9 %)
Survival	2 (2.9 %)
Swallowing-related	3 (4.3 %)
Therapy toxicity	8 (11.4 %)

peer reviewed literature. It is also possible that citation volume is proportionate to research output. Given the relatively smaller number of publications focused on supportive measures in oncology, it is feasible that the lower number of citations of supportive care research is reflective of less research in this field as opposed to less interest in such research endeavors.

While the majority of randomized controlled trials in oncology are now funded by pharmaceutical industry sponsors, we found that the majority of supportive care trials did not receive funding from an industry sponsor, which is in contrast to the non-supportive articles that often did [4]. This discrepancy between industry sponsorship of non-supportive care trials rather than supportive care trials serves as an opportunity for industry sponsors to engage more in research endeavors that work to improve patient symptoms or side effects from cancer or cancer-directed treatment. In fact, recent studies that have evaluated patient preferences for treatment options in genitourinary oncology have revealed that some patients may value the treatment experience and improvement in symptoms as opposed to prolonging survival [5]. As such, increased funding for supportive care measures in oncology may help to improve the proportion of studies that focus on helping individuals with cancer to live better as opposed to primarily focusing on helping individuals to live longer, to better align with individuals' priorities.

4.1. Limitations

There are several limitations to our analysis. We only included studies from four journals, and the results may not reflect that of the oncology literature at-large. We restricted studies to these journals because they are top oncology journals that receive a lot of attention. This helped to minimize journal-specific differences in social media activity that might have occurred had we included more journals with less impact. Second, we did not include all non-supportive care articles, and there could be variety in the topic of non-supportive articles, which would result in heterogeneity of study characteristics among these articles. Our focus was to evaluate social media and impact of supportive care articles, compared to other articles, in-general.

5. Conclusion

Among studies reporting on supportive care therapies in top oncology journals, we found that social media attention was no different than for articles reporting on non-supportive care topics, even though they were less likely to be later cited in the peer-reviewed literature and less likely to be funded by industry. It may be that social media activity is more reflective of the journal per se, and less likely to reflect interest in the topic of supportive care, as evidenced by the lower citations. While the topic of supportive care receives similar initial attention in social media, the lack of future citations may signal a disproportionate focus, which may be due to less funding and/or interest by researchers in the topic.

CRediT authorship contribution statement

Vinay Prasad: Funding acquisition, Methodology, Writing – review & editing. **David Benjamin:** Conceptualization, Methodology, Writing – review & editing. **Alyson Haslam:** Methodology, Writing – review & editing. **Sruthi Ranganathan:** Conceptualization, Data curation, Formal analysis, Writing – original draft.

Declaration of Competing Interest

V.P. receives research funding from Arnold Ventures through a grant made to UCSF, and royalties for books and writing from Johns Hopkins Press, MedPage, and the Free Press. He declares consultancy roles with UnitedHealthcare and OptumRX; He hosts the podcasts, Plenary Session, VPZD, Sensible Medicine, writes the newsletters, Sensible Medicine, the Drug Development Letter and VP's Observations and Thoughts, and runs the YouTube channel Vinay Prasad MD MPH, which collectively earn revenue on the platforms: Patreon, YouTube and Substack. DB receives Consulting or Advisory Role: Astellas, Eisai, Seagen. Speakers' Bureau:

Merck. Travel and Accommodations: Merck. AH and SR have no disclosures to report.

Appendix 1. Search Strategy

(((((("jama oncology"[Journal] OR "the lancet oncology"[Journal]) OR ("The Lancet. Oncology"[Journal])) OR ("Annals of oncology: official journal of the European Society for Medical Oncology"[Journal]) OR ("Journal of clinical oncology: official journal of the American Society of Clinical Oncology"[Journal])) AND 2019/01/01:3000/12/31[Date - Create] AND (clinicalstudy[Filter] OR clinicaltrial[Filter] OR comparativestudy[Filter] OR observationalstudy[Filter] OR randomizedcontrolledtrial[Filter])) AND (clinicalstudy[Filter] OR clinicaltrial[Filter] OR comparativestudy[Filter] OR observationalstudy[Filter] OR randomizedcontrolledtrial[Filter])) Filters: Clinical Study, Clinical Trial, Comparative Study, Observational Study, Randomized Controlled Trial Sort by: Most Recent.

("jama oncology"[Journal] OR "the lancet oncology"[Journal] OR "the lancet oncology"[Journal] OR "annals of oncology official journal of the european society for medical oncology"[Journal] OR "journal of clinical oncology official journal of the american society of clinical oncology"[Journal]) AND 2019/01/01:3000/12/31[Date - Create] AND ("clinical study"[Publication Type] OR "clinical trial"[Publication Type] OR "comparative study"[Publication Type] OR "observational study"[Publication Type] OR "randomized controlled trial"[Publication Type]) AND ("clinical study"[Publication Type] OR "clinical trial"[Publication Type] OR "comparative study"[Publication Type] OR "observational study"[Publication Type] OR "randomized controlled trial"[Publication Type]) AND (clinicalstudy[Filter] OR clinicaltrial[Filter] OR comparativestudy[Filter] OR observationalstudy[Filter] OR randomizedcontrolledtrial[Filter]).

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