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Randomized controlled trial of plain English and visual abstracts for disseminating surgical research via social media

Chapman SJ* (1). Grossman R* (2). FitzPatrick MEB (3). Brady RRW (4.)

*****Contributed to the study equally and are joint-first authors

1. Leeds Institute of Medical Research at St. James's, University of Leeds, UK
2. Buckinghamshire Healthcare NHS Trust, Amersham, UK
3. Translational Gastroenterology Unit, Nuffield Department of Medicine, University of Oxford, UK
4. Newcastle Centre for Bowel Disease Research Group, Newcastle Upon Tyne Hospitals NHS Foundation Trust and Newcastle University, UK

Correspondence should be addressed to: Mr. R. R. W. Brady, Newcastle Centre for Bowel Disease Research Group, Newcastle Upon Tyne Hospitals NHS Foundation Trust, Queen Victoria Road, Newcastle upon Tyne, NE1 4LP; United Kingdom; Email: Richard.brady@nuth.nhs.uk

Twitter: SJC (@SJ_Chapman); RG (@rebgross); MEBF (@doctorfitz); RRWB (@researchactive)

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Competing interests: RG is an Editor Assistant at British Journal of Surgery (2018-2019). RRWB is Lead of Social Media at British Journal of Surgery. RRWB is the owner of Researchactive.com Ltd., a company which provides healthcare technology solutions and social media consultancy, and Executive digital lead and associate Medical Lead for Digital and Social Media Engagement for the NIHR CRN North East and North Cumbria.

Abstract

Introduction: Patients are increasingly taking an active role in the design and delivery of surgical research. Public communication of results should also be encouraged but this is often limited to non-expert commentary. This study assessed the role of plain English abstracts disseminated via social media to engage patients and clinicians in the communication of surgical research.

Methods: A three-arm, randomized controlled trial with crossover of two intervention arms was performed. Manuscripts accepted for publication in BJS were allocated to three arms and disseminated via Twitter: plain English abstracts; visual abstracts; and standard tweets. The primary outcome was online engagement (a composite of “tweets”, “replies”, and “likes”) by members of the public within 14 days. The secondary outcome was online engagement by healthcare professionals.

Results: Forty-one manuscripts were randomized to plain English abstracts (n=14), visual abstracts (n=14), and standard tweets (n=13). The number of public engagements was low, with a mean of 1.8 (range 0-8), 2.5 (range 0-11), and 1.2 (range 0-4) for plain English abstracts, visual abstracts, and standard tweets, respectively. The mean number of engagements by healthcare professionals was 29.4 (range 6-66), 45.3 (6-161), and 28.8 (10-52). Overall, visual abstracts attracted a significant greater number of engagements than plain English (P=0.001).

Conclusion: Online, public engagement with surgical research was low. Overall engagement (predominantly from healthcare professionals) was enhanced by the use of visual abstracts. Future work may consider if and how the public wish to engage with plain English abstracts.

Introduction

Patients are increasingly taking an active role in surgical research but their access to study results is often limited to non-expert commentary.[1,2] It is essential for surgeon-scientists to communicate research in an accessible format so that patients can access research reports more readily. Several initiatives to improve this communication have already been launched, such as the National Institute of Health Research (NIHR) “make it *clear”* campaign and the British Medical Journal “patient and public partnership” initiative.[3,4] Both encourage public involvement in key stages of research, but the recognition of patients as consumers of research is still in its infancy.

The aim of this study was to assess the role of plain English abstracts, disseminated via social media, to engage patients and clinicians in the communication of surgical research.

Methods

Study Design

As the study did not involve human participants, clinical trial registration and research ethics committee approval were not applicable. A three-arm, randomized controlled trial with crossover of two intervention arms was performed between August and December 2018 (Figure 1A). Manuscripts accepted for publication in BJS were randomly allocated to three arms and disseminated via Twitter. These included: 1) plain English abstracts; 2) visual abstracts (a simplified graphical summary of a study's scientific abstract); and 3) standard tweets. The study was unblinded, but followers of the @BJSurgery account were unaware of the study.

Manuscript Eligibility

Manuscripts of clinical research (observational and interventional), as well as systematic reviews, were eligible for inclusion. Manuscripts were excluded if they described experimental research only, if they described expert commentary, or if a formal press release preceded publication.

Randomization

Computer-generated randomization was undertaken using the online randomization service, Sealed Envelope™.[5] Eligible manuscripts were allocated equally to the three arms (1:1:1) using random permuted blocks. The order of dissemination was pre-determined prior to randomization to reduce the risk of selection bias.

Abstract Development

All abstracts included the title and link to the full-text manuscript (Figures 1B & C).[6] Plain English abstracts were developed by investigator SJC and reviewed by a lay member of the public. Text was developed according to NIHR INVOLVE *'make* it *clear'* guidance and edited to satisfy a Gunning-Fog index of 13 or less.[3,7]. Visual abstracts were developed by investigator RG using scientific language and artwork. Standard tweets included a screenshot from the full-text manuscript. All abstracts were reviewed for representativeness by a member of the editorial team.

Abstract Dissemination

All abstracts were disseminated from the official BJS Twitter account (@BJSurgery). Abstracts were first tweeted according to their randomized allocation; plain English and visual abstracts were then crossed over and tweeted again after 14 days. To maintain continuity in outcome assessments, standard tweets were also tweeted again after 14 days.

Outcomes

The primary outcome was online engagement by the public within 14 days of dissemination. The secondary outcome was online engagement by healthcare professionals. Engagement was defined compositely as the total number of replies, retweets, or “likes” (favourites). Healthcare expertise was determined by careful review of Twitter biographies, tweet history, and online profile searches. Other outcomes of interest included: tweet impressions (total number of views), detail expands (interaction with tweets to view full detail), and link-clicks to the full-text manuscript.

Statistical Analysis

With no precedent for data variability, a formal power calculation was not performed. Manuscript characteristics were compared across dissemination groups, with Chi-square tests used for nominal variables and Kruskal-Wallis tests used for continuous variables. Outcome data were explored for normality and period effects between primary and crossover arms. Outcome data were analysed using Wilcoxon signed ranks and Mann-Whitney tests. Analyses were performed using IBM SPSS 22 (IBM Corp. Armonk, NY) and Prism version 8.0.2 (Graphpad Software, La Jolla, CA) with $P<0.05$ deemed to indicate statistical significance.

Results

Study inclusion

Fifty-three manuscripts were considered for eligibility and 41 were accepted. Reasons for exclusion were editorials (n=5), experimental research (n=5), and previous dissemination (n=2). During the study period, the number of @BJSurgery followers increased from 16,200 to 18,300.

Manuscript characteristics

Forty-one manuscripts were randomized to plain English abstracts (n=14), visual abstracts (n=14), and standard tweets (n=13). The majority were reports of non-interventional studies (n=24/41; 58.5%) in the field of general surgery (n=21/41; 51.2%). Authors were most commonly affiliated to institutions in Europe (n=28/41; 68.3%) and funded by non-industry sources (n=24/41; 58.5%). Overall, seven of 41 manuscripts (17.1%) were published open-access (Suppl. Table 1).

Engagement characteristics

Across all 41 manuscripts, there were 1489 engagements with primary tweets and 1499 engagements with crossover tweets. The majority of engagements were “Likes” (n=1626/2988; 54.4%) followed by “Retweets” (n=1309/2988; 43.8%). Most engagements were from healthcare professionals (n=2838/2988; 95.0%), with only 150/2988 (5.0%) received from the public. There was no significant effect of allocation to the primary or crossover arms on public and healthcare professional engagement (P=0.508 and P=0.830 respectively) (Suppl. Figure 1).

Total engagement, public engagement, and healthcare professional engagement

Overall, the mean number of engagements was 31.1 (range 6-72), 47.4 (range 7-167), and 29.9 (range 10-55) for plain English, visual, and standard tweets, respectively. Visual abstracts attracted a greater number of total engagements than plain English (P=0.001) (Figure 2A).

Engagement by members of the public was low across all abstract types. The mean number of engagements was 1.8 (range 0-8), 2.5 (range 0-11), and 1.2 (range 0-4) for plain English, visual,

and standard tweets, respectively. Although a small increase in public engagement was observed with visual abstracts, this was not statistically significant (P=0.082) (Figure 2B).

The mean number of engagements from healthcare professionals was 29.4 (range 6-66), 45.3 (6-161), and 28.8 (10-52) for plain English, visual, and standard tweets, respectively. Visual abstracts attracted significant greater engagements than plain English (P=0.001) (Figure 2C).

Additional social media metrics

Visual abstracts also attracted a greater mean number of impressions (5230 versus 4005; P=0.002) and detail expands (35 versus 23; P=0.03) compared to plain English abstracts (Suppl. Figures 2A & 2B). Standard tweets attracted more link clicks than plain English abstracts (37 vs 22; P=0.0013), whilst there was no significant difference with visual abstracts (37 vs 33; P=0.148). In addition, there was a trend of indeterminate significance towards visual abstracts attracting more link clicks than plain English abstracts (33 vs 22; P=0.053) (Suppl. Figure 2C).

Discussion

This study showed that social media engagement with research summaries was enhanced with the use of visual abstracts, compared to plain English abstracts and standard tweets. The majority of engagements were from healthcare professionals, with only 5% received from members of the public. Whilst standard tweets demonstrated the lowest number of engagements, they led to the greatest number of click-throughs to the full-text manuscript.

Whilst public involvement is encouraged in academic surgery, the results of this study demonstrated low levels of online public engagement across a broad scope of research summaries. The principle of engaging the public as consumers of research is still in its infancy. There is a good argument that the public should be informed about the findings of research studies, particularly those that are publicly funded, and previous evidence confirms that an appetite for this exists.[8] However, it is clear that more work needs to be done in collaboration with the public to understand if and how research should be disseminated beyond traditional scientific communities.

The popularity of social media platforms, such as Twitter, for disseminating surgical research has grown rapidly over the last three years.[9] This is evidenced from the development of specialty- and conference-specific “hashtags” (facilitating international discussion), journal specific journal clubs (facilitating post-publication peer-review), and sharing of new surgical techniques via live surgical coverage.[9-10] Visual abstracts are another such innovation that has transformed the dissemination of surgical research to academic audiences.[11] Plain English abstracts are yet to be used widely in research reports, but may have potential to promote research to a diverse online community.

A number of limitations of the current study are recognised. Firstly, although Twitter provides an accessible medium for social interaction, it represents only a limited group of individuals which may not reflect the wider population. On the other hand, the international reach of @BJSurgery is extensive and this precludes standardisation in the timing of tweets due to differences in international time zones. Secondly, it is possible that interactions with abstract summaries takes place without triggering engagement metrics; these interactions may also take place by individuals who are not direct followers of @BJSurgery. Unfortunately, it is not possible to measure these with

certainty. Finally, the study is limited by a general assumption that the public has an appetite for broad scopes of research. Members of the public, like healthcare professionals, may simply be attracted to specific research themes, shaped through their previous healthcare experiences.

Future work should focus on close collaborations with the public to ascertain how and in what format they prefer to engage with surgical research. Whilst dissemination of research summaries should be encouraged across broad communities, caution must be exercised in promoting sound bites of results, instead of balanced and educated interpretation.

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Figure 1: Study design. (A) Manuscripts accepted for publication in BJS were randomized to one of three arms for the first tweet: plain English abstract, visual abstract, or standard tweet. After a 14-day interval, a second tweet was sent, with manuscripts assigned to plain English and visual abstracts crossing over to the alternative format. An example of a visual abstract **(B)** and plain English abstract **(C)** are shown from Di Saverio et al.[6]

Figure 2: Engagements across abstract types: Engagements per tweet (a composite of likes, retweets, and replies) for plain English abstracts (blue), visual abstracts (red), and standard tweet (black), are displayed for total number of engagements **(A)**, non-healthcare professional engagement **(B)**, and healthcare professional engagement **(C)**. Individual values, mean and SEM are displayed on the left, with paired data on the right.

*** p<0.001; ns non-significant

Suppl. Figure 1: Primary and crossover arms did not differ in non-healthcare professional and healthcare professional engagement. Engagements per tweet (a composite of likes, retweets, and replies) for all manuscripts in the primary and crossover arms are displayed. There was no statistical difference between the two arms.

HCP: healthcare professional; non-HCP: non-healthcare professional

Suppl. Figure 2: Impressions and detail expands are increased by visual abstract social media posts. Impressions (A), Detail expands (B), and Link clicks (C) for Plain English abstracts (blue), Visual abstracts (red), and standard abstracts (black) are displayed. Individual values, mean and SEM are displayed on the left, with paired data on the right. * $p<0.05$ ** $p<0.01$.