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Commentary

# Hope for the best, but prepare for the worst: Social media posted by participants in stem cell clinical trials

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ABSTRACT

This article examines the influence of social media posts on clinical trials involving stem cell–based interventions. Based on the literature review, we identified three potential risks associated with social media posts regarding clinical trials that involve stem cell–based interventions: (1) threats to scientific validity, (2) amplification of excessive expectations, and (3) breaches of confidentiality. Additionally, preliminary recommendations are provided to safeguard the value of stem cell clinical trials for future patients in the age of social media. Our approach aims to safeguard the well-being of forthcoming participants and ensure the scientific validity of stem cell research, as well as possibly aid in the further development of shared guidelines for posting stem cell clinical trial information on social media platforms.



The emergence of social media has both positively and negatively affected clinical trials over the past decade, including in the stem cell field [e.g.,1]. Using social media for clinical trials has reported several benefits, such as the dissemination of ongoing research projects, publication of research results, support of advocacy work, education of patients, recruitment of trial participants, and provision of information on medical research [2–4]. Specifically, interviews with rare disease patients and their families have revealed that they communicate in great detail through social media, sometimes using videos, on new treatment options [5]. This can be highly useful for patients to understand novel treatments and collect needed information, especially for rare diseases. However, the impact of the negative aspects of social media on stem cell clinical trials should also be investigated. For example, one reported negative effect of social media usage has been direct-to-consumer advertising for unreliable, unproven stem cell treatments, which puts patients' health at risk [6].

While the impact of legacy media (e.g., mass media), including agenda setting and framing in the sphere of public discourse, has long been noted [7,8], such impact has grown in the ubiquitous social media sphere by being redefined, amplified, or only partially extracted. Debates developed in the social media sphere not only influence the sphere of public discourse but also significantly impact legacy media orientations [9]. In terms of their impact on stem cell clinical trials, traditionally, news such as stem cell trial initiations and their sparkling results are announced through legacy media [10,11] and can be shared within the online community of patients awaiting the opportunity to participate in clinical trials. Then, patients who have participated in a clinical trial may post their experiences and impressions. In some cases, these posts may go viral. They may mingle with the hype of regenerative medicine with unclear evidence, which may be disseminated through legacy media. Such interactions between legacy media and social media have significantly impacted stem cell clinical research as a field of cutting-edge research.

Thanks to researchers' extensive efforts in the stem cell field, clinical trials using novel cells, such as embryonic stem cells and induced pluripotent stem cells, have been initiated in recent years,

*Abbreviations:* ICH, International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use; ISSCR, International Society for Stem Cell Research.

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and there are further plans for cutting-edge trials [12]. However, the impacts of social media posts by participants in clinical trials involving stem cell–based interventions have received little research attention. These potential impacts should now be assessed to protect the future value of such trials and to consider the value of the research to current patients.

In this article, we extract and examine three possible concerns—threats to scientific validity, amplification of excessive expectations, and breaches of confidentiality—with preliminary recommendations for addressing these issues and enhancing the value of social media usage for stem cell clinical trials. This may contribute to the future development of shared guidelines for posts relating to stem cell clinical trials on social networking sites.

## 1. Loss of scientific validity of clinical trials

At a time when novel stem cell clinical applications are being developed and are frequently covered extensively in legacy media, the related impacts of social media posting by research participants should be examined carefully. The value and risk associated with social media vary depending on how it is used [13] and framed. A potential concern may arise from posts by certain participants who prioritize their own interests over complying with the requested rules. Such participants may violate the study requirements and attempt to conceal any wrongdoing from the researchers [14]. Although the issue of rule-breaking in clinical trials is not a new topic [14,15], its influence should now be carefully considered in the age of social media [16], especially in the field of stem cell research.

As has been reported—mainly in general pharmaceutical trials—such rule-breaking participants may disrupt the trials by using social media in the following ways: exchanging information with other participants to deliberately modify their health information to qualify for trial participation; concealing or managing any side effects to avoid being removed from the trial; and discovering whether they are receiving a placebo and, as a result, possibly withdrawing from the trial due to feeling that they would miss out on receiving a potential therapeutic benefit from the trial drug [15,16]. In any of these scenarios, deception or behaviors in bad faith by rule-breaking participants can greatly distort the scientific integrity of the research [3], potentially causing harm to future patients.

Particularly for stem cell clinical trials, deception by rule-breaking participants with unmatched trial eligibility criteria or unreported side effects may expose the participants to greater—and potentially longer-term—risks than those faced by pharmaceutical trial participants. Such risks are most prominent with invasive procedures, such as surgery, and/or administration of stem cell-based products with a specific biological nature. Moreover, as stem cell clinical trials tend to focus on rare diseases and patients with conditions for which they have exhausted other treatment options, the statistical impact of such deceptions on these trials could be much larger than in clinical trials for common diseases, thus greatly decreasing the social value of the trials.

## 2. Amplification of excessive expectations regarding ongoing stem cell clinical trials

Stem cell hype—"the state of scientific progress, the degree of certainty in models or bench results, or the potential applications of research are exaggerated"— [17] has frequently been raised as an issue in the field. Certain kinds of social media posts may further fuel unrealistic expectations for stem cell clinical trials. It is understandable that trial participants may desire to use social media to create an online record for themselves or share experience-based information that could help someone with the same condition. However, sharing information about ongoing clinical trials could lead to misconceptions about those trials, which can be counterproductive.

Combined with the legacy media effect, posts by an individual participating in a clinical trial may unintentionally offer overly optimistic or other misleading impressions of the trial through their personal experiences and intuitive impressions. Moreover, through the specific regulatory framework of pre-approval non-trial access to experimental stem cell-based interventions, such as expanded access for patients suffering from rare diseases [18], patients may receive an experimental treatment that is still being studied. There is the possibility that patients who participated in trials or received such experimental treatment and feel that they have benefited, may share their experience on social media. In these cases, their followers might misinterpret the information as proof of a state-of-the-art treatment's effectiveness. Although their original motivation for posting can be to inform benevolently other patients about such opportunities, the nature of a scientifically unproven status requires the development of strategies to prevent unintentional misunderstandings and ultimately protect both the patients and the research from negative consequences.

To our knowledge, it seems that no guidance has yet been clearly stated in international documents for clinical trials, such as ICH-E8, but various useful statements have been made in local contexts. Although in the clinical care context, the Japanese Medical Care Act states that using "experiences about the content or effect of treatment based on a patient's subjective impressions or the hearsay of others" in settings such as clinic websites can be subject to regulation [19], as such experiences could potentially be used for problematic healthcare advertisements. Participants' impressions of a treatment and its effects can be influenced by their subjective perceptions and are likely not based on scientific evaluation, which might cause misinterpretation when communicated via social media. Additionally, the ISSCR guidelines advise that "the use of patient anecdotes, testimonials, or other language that could be construed as promotional, promissory, or suggestive of clinical effectiveness in reference to stem cell–based interventions for which efficacy has not been established is to be avoided" when communicating with patients about their clinical care [18]. To avoid undesirable consequences, it may be useful to explain to potential and current trial participants how social media coverage based on subjective impressions may have unintended impacts on or mislead others. This will be further addressed in the recommendations section.

## 3. Breaches in the confidentiality required for clinical trials in stem cell fields

Trials of stem cell therapies often involve using a wide range of techniques that span several biomaterial sources, from intravenous infusions to transplants, designed to examine the effectiveness of the treatment method. As such technological information is valuable, including that which relates to intellectual property, it should be strictly protected in a confidential manner. Accordingly, stakeholders, including the research team and ethics committee members, take great care of their confidentiality. In this regard, there is a space in which to discuss the potential risk of research participants who unintentionally share sensitive and confidential information on social media.

As for information management in clinical research, while the protection of participants' personal information is strictly considered and managed, it depends on the research project whether to explain the confidentiality of the research contents to participants during the informed consent process. However, a breach of confidentiality could waste researchers' and participants' efforts by diminishing the future social value of the research results.

Researchers may need to take responsibility for ensuring that participants understand the importance of keeping the research content confidential—that is, to protect its social value and avoid the unintended negative effects that may arise from sharing subjective impressions of the treatment(s).

Still, there is a concern that participants may feel that they have lost the opportunity to publicly express or exchange thoughts about their trial participation. To avoid this, researchers should convey that they do not intend to interfere with the participants' right to communicate with other patients or impinge on their right to self-expression, other than in matters of scientific validity, excessive expectations, and confidentiality.

## 4. Preliminary recommendations

Based on these observations, we have formulated some recommendations for potential first steps toward addressing the challenges posed by research participants' social media usage during stem cell clinical research.

First, when obtaining informed consent, the researchers could communicate to the participants [3] that sharing posts containing details of the research content and subjective results could hurt the research's confidentiality and outcome. It is also worth highlighting that the safety and efficacy of the trial results must be analyzed using data obtained from all trial participants and not based solely on individual results.

Second, the researchers could ask the participants in their current trials whether they intend to share their experiences of participating in their clinical trial on social media and attempt to understand and address the reasons why they might do so. This would allow the researcher to give the participants some points to be aware of regarding social media posts. If the reason for the posting is, for example, to find someone to consult about concerns that are difficult to ask research project members, the researcher could address this by referring the participant to a suitable person or department outside the research project.

Third, the researchers could invite participants from previous trials and other relevant people to present ideas on valuable ways to use social media for research projects and effective ways to prevent unintended negative effects. Based on their experiences, they would be well placed to understand why trial participants may desire to share information on social media—this could present valuable insights into how to prevent the negative impacts of social media usage. By collaborating with them, the researchers could identify strategies to avoid negative effects on current and upcoming clinical trials from social media posts.

Finally, in cases where patients receive pre-approval non-trial access to an experimental therapeutic intervention under specific regulatory systems, as previously described, medical providers need to ensure that their patients accurately understand the uniqueness of the regulatory framework. To help prevent misunderstandings or confusion in cases where patients want to share their experiences, medical providers could offer patients clear and concise information to include or cite about the specific regulatory system in their social media posts.

In practice, the effectiveness of these recommendations relies primarily on the understanding and cooperation of researchers and healthcare providers. Concerning the potential harm that may arise from the internet's influence on medical information, solutions such as training medical professionals, and increasing community engagement have been suggested [20]. It would be beneficial to create guidelines, provide practical training for researchers on such guidelines through professional societies, and engage with experts in areas such as science communication and risk communication to inform the public better.

## 5. Conclusion

This paper focused on three key concerns related to participants sharing information about stem cell clinical trials on social media: threatening scientific validity, increasing high expectations, and breaching the confidentiality of the research content. The intention was to provide recommendations for protecting the value of stem cell clinical trials for current and future patients in an age of community-based information sharing through social media. As preliminary steps, we recommend informing participants of the potential negative impacts of social media posts; guiding participants on how to prevent unintended negative consequences while sharing their posts; planning for patient or participant engagement to combat this issue effectively; and providing detailed information on the related regulatory system. Social media posts by trial participants can be useful. For example, they may provide insights that would otherwise go unnoticed by research team members and other stakeholders regarding trial participation. Or they may help improve the research environment, such as by revealing needed improvements in the clinical trial from the patient's perspective. The nature of the relationship between social media and clinical trials needs to be examined and updated continually while considering its impact on public discourse.

It is necessary to raise international awareness about the issues surrounding stem cell clinical trials that arise from the easy and rapid sharing of information worldwide. Looking ahead, further international collaborative discussions on the appropriate use of social media in clinical trials would support the better development of new stem cell therapies for patients around the world.

## Author contributions

Original draft—K. T., and K. M.; revision and review—K. T., J. M., S. C., and K. M.; funding acquisition—K. T., J. M., S. C., and K. M.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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