

Online Social Media Practices in Nuclear Medicine and Molecular Imaging: A Concept to Incentivize Creation of Digital and Web-Based Content

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From the Newsline editor: This report includes the results of an online SNMMI PET Center of Excellence (COE) survey and addresses a topic of interest to SNMMI members interested in incorporating online social media authorship into their academic and professional activities.

Promotion and/or tenure (P&T) often depend on traditional scholarly metrics (e.g., number of publications, number of citations, journal impact factors, h-index) as indicators of impact and quality within the field (1–3). Nuclear medicine and molecular imaging (NM/MI) professionals are encouraged to pursue accepted approaches to achieve sufficient metrics for performance evaluation and P&T decisions (1–2).

In recent years, a new paradigm for knowledge generation and dissemination has rapidly evolved. Online social media (OSM) include Internet-based tools and applications that allow creation of user/interest communities and sharing of user-generated content that is more timely and interactive than traditional forms of knowledge generation and dissemination. These OSM tools include websites that contain user-generated content, social and professional networking sites, image blogs, microblogs, podcasts, webinars, video networks, wikis, video/teleconferencing tools, and professional organization websites with open access resources for medical education and professional development (2, 4–8).

Patients are also using OSM to obtain and share the latest developments in medicine, solicit opinions, and engage in interactive discussions and communication about health care treatment (7). OSM tools are being used for evaluation and rating of physicians, medical practices, and medical centers (4, 9). Patients are increasingly using OSM tools to find out more about diseases, imaging tests, treatment options, which physicians to choose, and at which hospitals to seek care, as well as sharing their experiences with others (4). OSM ratings for NM/MI physicians and professionals have not yet been routinely used for performance evaluation and P&T, but, given the current focus on patient satisfaction and quality metrics, it is conceivable that such OSM metrics or other analytic surrogates may begin to play a role in the future.

A caveat is that web-based search engines may provide users with out-of-date and/or low-quality information with no easy means of distilling the most relevant information. In the context of health care, outdated and low-quality information

can be problematic, because the user may rely on such information for guidance. The recent emergence of “fake news” has highlighted the importance of the quality and validity of OSM, an aspect that is critical for health care-related information.

NM/MI professionals generate up-to-date, high-impact, and clinically relevant information for websites of professional organizations. Academic faculty who contribute to these sites find it challenging to subsequently measure and report their contributions (2). Within the expectations of P&T criteria, the dissemination of scholarly content (1) is imperative. An alignment of these expectations with the needs of professional organizations is increasingly essential to appropriately and timely serve members and their communities. For NM/MI professionals who contribute to the generation of high-quality scholarly content on behalf of our professional organizations, new concepts for recognizing and rewarding OSM are needed. The goal of this study is to identify challenges and opportunities for incentivizing NM/MI professionals to generate up-to-date, high-quality OSM content.

A Search of the Literature

A search of the published literature and web-based content related to OSM, digital media, radiology, NM, tenure, and academic promotion was conducted to identify emerging themes and concepts. A PubMed search (MeSH term “online social media”) yielded 1,955 publications, with annual numbers rapidly increasing. Only 19 publications were listed for “online social media AND imaging,” and 28 publications for “online social media AND radiology” from 2007 to 2016. No publications were found for “online social media AND nuclear medicine” or “molecular imaging.” OSM recognition for P&T was found only in the social sciences (8, 10). Few institutions and organizations explicitly recognize OSM content or OSM contributions as part of their review process (8).

One study proposed that OSM content and contributions should be given some consideration by P&T review committees (8), with some concern about the ways in which OSM content is categorized (research, service) and quantified relative to traditional scholarly metrics (8). Altmetrics, a commercial tracker and aggregator of online citations and commentary, represents one possible solution for providing

impact metrics for an individual's performance evaluation and P&T (1, 2).

Although original OSM content may not often be cited in traditional scientific literature, it can serve as the basis and background for a subsequent traditional manuscript (11). It can be argued that the nature of some OSM contributions constitutes original research through review of the literature and synthesis of new knowledge that is disseminated in a nontraditional manner (8). It has been suggested that the most productive academic faculty members with regard to traditional publications are those in the medical disciplines (12). Unlike traditional approaches, original OSM content can be more rapidly and widely disseminated than traditional print literature. OSM content can be discussed and referenced within minutes within the community using blogs, tweets, podcasts, etc. Only limited reports have examined OSM tools in medical imaging (4, 5, 7, 9), and none specifically address OSM within the NM community.

Survey on OSM Utilization and Recognition Practices

We also developed and implemented an online SurveyMonkey assessment for NM/MI professionals who are members of SNMMI. A social science IRB determined the study to be exempt. The survey included 19 (mostly) multiple-choice questions with fill-in options. Participants were recruited via SNMMI e-mail invitations containing a URL link. Participation was voluntary, and survey identity tracking was disabled. The survey was opened on December 17, 2016, and responses received by February 4, 2017, were included in this evaluation.

A listserv invitation was sent out to 933 members of the SNMMI PET COE community, of whom 124 clicked the link to the survey. Sixty-two responses were entered using the online survey tool. Participants were asked about their utilization of different kinds of OSM content tools and asked to elaborate on their most frequently used OSM tools. Participants were then asked about recognition of OSM during performance evaluation or P&T.

Sixty-seven percent of respondents were men, 25% were women, and 8% did not disclose gender. Respondent ages were well balanced from 30 to 70 years. The majority of respondents were from North America and 12% from Europe. Seventy-three percent identified their primary professional specialty as NM/MI, 18% as diagnostic radiology, 8% as radiopharmaceutical chemistry, and 1% as medical physics. Fifty percent were from academia/universities, 38% from private practice organizations, and 12% from government organizations.

Respondents reported a variety of OSM tools used professionally within the last 24 months. Online search engines (89%), video/teleconferencing (75%), literature searching tools (75%), listserv groups (71%), and professional social networking (71%) were the most utilized. In the same time period, respondents reported using the following OSM tools for personal use: online search engines (92%), smart phone apps (65%), wikis (50%), blogs for reading (45%), and nonprofessional social networking (44%). Use and contribu-

tion to online service rating websites, reading wikis, and reading blogs were all more frequent for personal purposes. When respondents were asked to identify their 3 most utilized OSM tools professionally, online search engines (84%), literature searching tools (53%), and video/teleconferencing (33%) were the most frequently reported.

When addressing performance evaluation/P&T at their institutions, 17% of respondents stated that OSM contributions are recognized, 28% that these are not formally addressed, 28% that these are not recognized, and 27% were not aware of their organizational policy. On the other hand, 57% of respondents' organizations formally recognize peer-reviewed poster presentations, 63% recognize oral presentations, and 75% recognize peer-reviewed publications in their performance assessment and P&T processes, in keeping with traditional academic metrics.

Within the last 24 months, 73% of respondents reported authoring a peer-reviewed publication, 75% served on an institutional or local practice committee, and 65% served on a national professional committee/board. Fewer than 14% of respondents reported active participation in online-only content generation, whereas 31% had been an author on an online-only journal publication. When asked whether OSM content contribution should be considered for credit toward an individual's performance evaluation/P&T, 68% of respondents agreed, whereas 32% disagreed. Of note, 35% of respondents stated that they held an organizational position in which they actively review, assess, or recommend outcomes related to performance evaluations, promotion, and tenure.

In regard to contributing to OSM, 28% of respondents indicated that their current institutional lack of recognition for OSM authorship affects their willingness to make such contributions, with 10% undecided. However, 46% indicated that a positive recognition of OSM content would incentivize their willingness to contribute, with 13% undecided.

Results and Opportunities

Peer-reviewed literature and OSM have evolved to be very different knowledge-sharing pathways (12). Online search engines are today's guides to the answers we seek, and this online content is fast and readily available. OSM is also a bridge between the "anybody can post anything" content reality of the Internet and the scientifically, peer-reviewed content of classic academic communication.

The desire and willingness to advance science are undoubtedly strong personal motivators in the pursuit of professional service. Organizations like SNMMI, the American College of Nuclear Medicine, and the American College of Radiology representing the community of imaging experts and members may be asked to provide up-to-date scholarly and educational materials on emerging concepts and methodologies. With the recent approval of new radiotracers, theranostic approaches, and emergence of new technologies, we recognize the need for new OSM knowledge creation to supplement or replace the existing body of OSM scholarly

and educational content. Without properly aligned career opportunities and recognition, qualified content contributors may not be able to justify such efforts. New incentives are probably the most effective way to implement new knowledge generation and dissemination (12).

Although it has been reported that junior faculty more often adopt and utilize OSM tools than senior faculty counterparts (8), we did not find this trend for professional use only for private use. Active contribution of OSM content can increase one's community reputation and provide new academic opportunities (13), in addition to maximizing visibility and marketing imaging services (7). The wider adoption of OSM platforms within the NM/MI community represents a key enabler for today's knowledge dissemination and should be a top priority.

The scientific publishing industry is rapidly adopting and integrating many aspects of OSM for its constituents (8, 12, 14–17). The National Science Foundation redefined scholarly metrics in 2013 and now includes web-based and OSM content (2). Despite these efforts, new content for scholarly or educational OSM is unlikely to be recognized as significant or impactful for its authors unless such content is linked/published to a journal that has an impact factor rating and can be indexed in Google Scholar or PubMed with a unique digital object identifier (DOI) (2, 13). The Mayo Clinic recently announced that digital content contribution would be recognized in promotion reviews, consistent with their 2010 initiative to establish a social media network to provide OSM training and opportunities (18–19). Most medical organizations have not yet developed formal processes to recognize OSM content. Therefore, we propose new and independent or surrogate metrics for OSM contribution recognition.

OSM tools are routinely utilized, and professional social networking is prevalent. Although OSM utilization is high, active contribution to such content by NM/MI professionals is low. Despite the fact that professionals actively seek out OSM content, 32% of respondents stated that OSM contributions should not be recognized for performance evaluations. A total of 83% of respondents stated that OSM contributions are not addressed or recognized (or they were unaware of policy) for performance evaluation, whereas peer-reviewed presentations and publications were generally recognized (>70% of respondents). This implies that formal editorial processes (e.g., peer review) for OSM content generation can potentially change this perception. It is troubling that 38% of respondents indicated that the lack of professional recognition for OSM authorship may affect their willingness to contribute. On the other hand, 46% of respondents indicated that professional recognition of OSM content would be an incentive.

A Concept for Recognizing OSM Contributions

In Figure 1 we propose the following concept for incentivizing individuals with performance credit for pro-

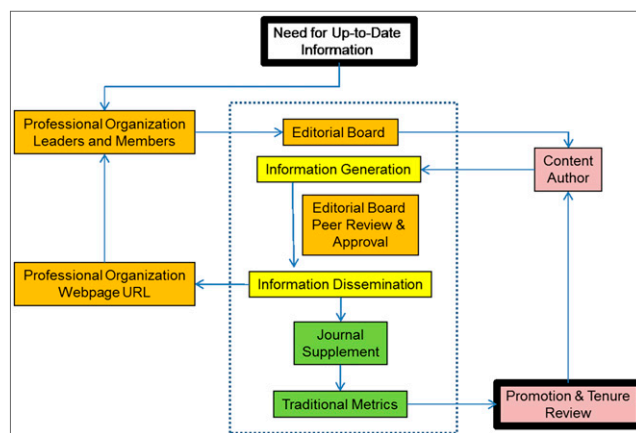


FIGURE 1. A framework for incentivizing authors of online social media content by providing traditional academic credit for performance evaluation/promotion and tenure review.

viding quality and timely OSM content for professional organizations.

1. The need for up-to-date information on a specific topic would be recognized by a professional organization's leadership, and a formal editorial board would be established for online content.
2. This editorial board would create a proposal process through which subject matter experts (or invited authors) could prepare new content to be disseminated using web-based/OSM platforms.
3. The author would prepare and submit the invited content to the editorial board for peer review and include all relevant references and acknowledgments within this content submission.
4. After peer review, editorial revisions, and approval, the new content would be disseminated by the organization as web-based/OSM content and identified as peer reviewed.
5. This open-access content would be provided with (a) a unique DOI; (b) a designated URL; and (c) published in abstract form in an online supplement within a traditional journal with an impact factor rating.

This process is similar to current peer review for scientific and educational abstracts submitted for SNMMI meetings and subsequently cited in a journal supplement. Contributions would be thus indexed and searchable on PubMed. This process enables both citations and traditional metrics for performance evaluation.

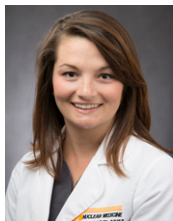
Conclusion

Professional OSM use is growing in the NM/MI community. Contrary to the current practices for traditional scientific presentations, willingness to contribute to OSM remains low, in part because of a lack of recognition for performance evaluation and promotion. We propose the establishment of an OSM editorial board, peer review, and abstract publication in conventional publications to enable appropriate quality assurance and effort recognition.

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Outstanding *JNMT* Articles for 2016

Norman E. Bolus, MSPH, MPH, CNMT, editor-in-chief of the *Journal of Nuclear Medicine Technology (JNMT)*, and members of the journal's board of editors announced in May the winners of annual awards for outstanding articles. The awards were presented at the SNMMI-TS Business Meeting & Awards Ceremony on June 13 in Denver, CO.



Shelley N. Acuff

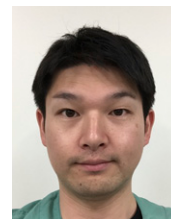
Shelley N. Acuff and Dustin Osborne from the University of Tennessee Medical Center (Knoxville) were recognized with the Editors' Choice Award for the best *JNMT* continuing education article, "Clinical workflow considerations for implementation of continuous-bed-motion PET/CT" (*J Nucl Med Technol.* 2016; 44:55–58).



Grace Brayshaw

The Editors' Choice Awards for the 3 best *JNMT* articles in 2016 went to: Grace Brayshaw, from the University of California Davis Medical Center (Sacramento), Sharon Mosley, and Geoff Currie for "Increased gastric activity on myocardial perfusion imaging" (*J Nucl Med Technol.* 2016;44:195–

198); Yoya Tomita, from Mie University Hospital (Tsu, Japan), Masaki Ishida, Yasutaka Ichikawa, Naohisa Suzawa, Shigeki Kobayashi, Hisato Maeda, Kan Takeda, and Hajime Sakuma for "The effect of misregistration between CT-attenuation and PET-emission images in ¹³N-ammonia myocardial PET/CT" (*J Nucl Med Technol.* 2016;44:73–77); and Sarah R. Pigmon, from the Indiana University School of Medicine (Indianapolis), Kara D. Weatherman, Nicholas C. Brehl, and Cybil J. Nielsen for "The necessity of using heparin in the UltraTag RBC kit when tagging blood for a nuclear medicine study" (*J Nucl Med Technol.* 2016;44:230–233).



Yoya Tomita



Sarah R. Pigmon

"These articles represent the broad range of investigation and practice that characterize the rapidly changing world of nuclear medicine and molecular imaging technologies," said Bolus. "We congratulate this year's awardees and all those whose contributions continue to make *JNMT* a vital resource for a diverse and growing community."

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