Nuclear Medicine Education Via Instagram: A Viable Method for Informal Lifelong Learning

Paige Bennett, MD[1] and Kathryn Morton, MD[2]

1. Nuclear Medicine Section, Department of Radiology, Wake Forest University Health Sciences, Winston-Salem, NC

2. Nuclear Medicine Section, Department of Radiology, University of Utah Health Sciences, Salt Lake City, UT

Corresponding Author:

Paige Bennett, MD; Nuclear Medicine Section, Department of Radiology, Medical Center Boulevard, Wake Forest University Health Sciences, Winston-Salem, NC 27156; Phone: 336-716-3590; Fax: 336-716-6108; Email: Paige.Bennett@wakehealth.edu

Reprints not available.

Word Count: 1,356

Short running title: Nuclear Medicine Education Via Instagram

Abstract

Formal and informal lifelong learning allows nuclear medicine professionals to grow and change over time within this dynamic field. Over the past two decades, internet-based websites have provided instantaneous access to informal learning opportunities, including nuclear medicine reference articles, videos and webinars, and case-based learning. More recently, medical educators have explored social media platforms including Instagram, Facebook, and Twitter to provide nuclear medicine education. This article discusses the use of Instagram as a platform for lifelong learning in nuclear medicine. Several nuclear medicine Instagram sites are introduced and user characteristics and participation for a representative site are presented in an effort to learn more about this educational forum, which is increasingly being recognized among academic educators.

Key Words: Nuclear medicine education; social media; lifelong learning; student-centered learning; global health equity

Web-based and digital technology provides opportunities for formal and informal nuclear medicine education. See Table 1. Medical education on social media platforms such as Instagram, YouTube, Facebook and Twitter allows for informal learning that helps break down geographic, professional, or educational level learning barriers. If a learner is simply interested, then educational material can be accessed through smartphones, tablets or computers connected to the internet. [1-2] Academic medical educators across various specialties have embraced social media as an effective platform for educational activities. In addition, these educational efforts on social media are now being included as metrics for academic promotion and tenure. [3]

Used by over 25 million people, Instagram is especially useful for students of nuclear medicine because it allows for multiple image or video-based posts along with a caption area for explanations/didactics. Two-way interaction between followers, other learners, and educators is available through likes, shares, and comments. Ideally, the Instagram platform is an easily accessible, educational format that is available worldwide at any time of day. Costs for participation are minimal for users, who simply need internet access and a free Instagram account to participate. Additionally, this is a convenient method for educators to deliver content to diverse learners at different educational levels.

There are multiple imaging-based educational sites on Instagram that post educational cases focused on nuclear medicine. See Table 2. These educational sites have follower numbers in the hundreds to thousands. Despite the large numbers of followers of these sites, the literature has not elucidated characteristics of followers of these sites, including geographic location, gender, and age, nor the level of follower participation in this educational forum. [1-2, 4-5] Therefore, we gathered preliminary data on followers and

participation levels on our nuclear medicine education site on Instagram in an effort to learn more and to promote educational scholarship regarding these sites.

Based in the United States where nuclear medicine and radiology are commonly practiced in the same department, the @nuclear_radiology Instagram site offers nuclear medicine educational posts to over 7,000 followers around the world. Started in 2016, the site currently provides interactive posts regarding nuclear medicine technical issues, clinical diagnoses, imaging findings and interpretation, and artifacts and pitfalls. See Figure 1 for a representative post.

Following IRB approval (exempt), we collected anonymous information on characteristics of followers of the @nuclear_radiology Instagram using the InsTrack for Instagram app (Innovatty, LLC). User characteristics analyzed included: country of origin, gender, and age. Overall follower participation rates were determined for a variety of educational posts. Technologist participation rate on a specific post that allowed users to self-identify as nuclear medicine technologists was also analyzed.

Country of origin

Analysis showed the proportion of @nuclear_radiology followers from North America was 30.41%; Asia, 15.65%; Middle East, 13.72%; South America, 12.61%; Europe, 10.45%; European Union, 7.41%; Africa, 5.12%; Central America, 2.69%; and Oceania, 1.95%. See Supplemental Table 1.

Produced in English, data shows approximately half of @nuclear_radiology followers are from countries with a high proportion of English speakers. Thirty-eight percent of followers were from countries where English is spoken as the primary language: The United States, Canada, United Kingdom, South Africa, Nigeria, Singapore, and Australia. The percentage of English-speaking followers increased to 47% when India -- a country that has the 2nd-largest English-speaking population of ~125 million – was added.

About 45% of followers are from the Americas (Central, North, and South America). Note that English proficiency in many Latin American countries is high, including Argentina, Brazil, and Mexico.[6] Near equal proportions of followers are from the Middle East, Asia and Europe/European Union (13-17%). Note that no followers are from China or Hong Kong, as Instagram was banned there in 2014 after pro-democracy protests.

The international nature of the Instagram platform and followers nearly worldwide suggests this type of informal learning may be useful in regions of the world that have limited educational resources and access. In a 2016 article in the American Medical Association's *Journal of Ethics* entitled, "Medical Education and Global Health Equity," the authors explain that there are efforts underway to "expand medical training in resource-constrained settings" to improve global healthcare disparities. And, that innovative medical education is required for this effort. In short, "medical educators need to rethink both what they teach and *how they teach*" the authors assert. [7 (italics added)] Educational innovations including social media-based efforts could serve to improve

global health equity by improving access to educational materials and strengthening ties between educators and students worldwide.

Age and gender

Analysis of age of @nuclear_radiology followers shows that 69.8% (5,387) are 18-34 years old. Worldwide, 64% of Instagram users are 18-34 years old.[8] This suggests that Instagram-based nuclear medicine education may be useful in the age groups that are commonly undergoing technologist training, medical education and residency, and early career. Some studies suggest that younger learners especially appreciate social media sites for medical education because of its "ease of use, … structure, and the breadth of information that these sites provide." [9-10]

On the date of analysis, 13.2% (782) of users were 18-24 years old; 56.6% (3,360) of users were 25-34 years old; 21% (1,245) of users were 35-44 years old. The remainder were 45 years or older (9.2%). See Table 3. On gender analysis, 51.5% of users were women and 48.5% were men.

Participation Analysis

Engagement levels on social media posts and sites seek to quantify the participation of users on single or multiple posts.[11] Participation levels are determined by counting the number of actions performed by users in relation to a post, such as: number of likes on the post, shares of the post, comments on the post, post saves to user files, visits to the main profile as a result of the post, and followers gained in relation to a post. Although

engagement rates for medical education sites are unknown, in 2019, industries such as higher education (alma mater, fans, current students) have an overall Instagram engagement rate of 3.96%; nonprofit organizations: 2.4%; media sites: 1.22%; and influencers (people on social media who attempt to influence followers to buy products): 1.97%. Median engagement rate per post on Instagram in 2019 across all industries was 1.6%.[12]

Participation (or engagement) analysis of a post that asked followers to self-identify if they were a nuclear medicine technologist led to 607 actions of participation ("like," "comment," "share"), a participation rate of 13.3%. This participation rate on the post asking followers to self-identify as a nuclear medicine technologist suggests the possibility for high levels of participation by nuclear medicine technologists and technology students on this forum.

Engagement analysis of followers on 10 educational posts on @nuclear_radiology showed an average participation level of 5.1%. The lowest participation rate was 2.7%, on a post about pleural mesothelioma on F-18 FDG PET. The highest participation rate was 6.5%, on a post about Takotsubo cardiomyopathy ("broken heart syndrome") on Tc-99m tetrofosmin cardiac stress test. Engagement was calculated as user actions and/or participation that occurred because of the post divided by impressions (number of times the content was shown to users or could have been seen by users). For example, on the post in Fig. 2, approximately 292 followers either liked, shared, commented, saved, visited the main profile, or followed the site after the post. This number was divided by

6,154 impressions tallied by InsTrack for the post for an engagement rate of 4.7%. See Table 4.
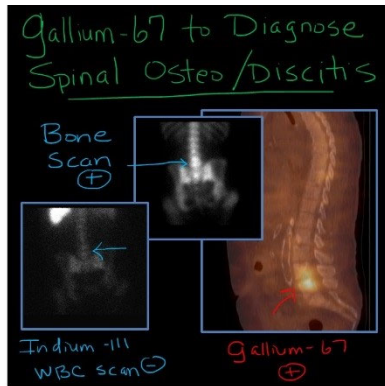
The average participation rate on educational posts of 5% shows participation of up to 350 learners on each post. Although this level of active follower participation would seem positive relative to levels of engagement for overall Instagram usage, engagement levels for Instagram sites dedicated to medical education have not been fully quantified as yet.

In conclusion, this informal analysis shows that Instagram can be an acceptable method of informal nuclear medicine education, particularly in the age groups associated with in-training and early career learners worldwide. Compared to the daily learner engagement opportunities of traditional nuclear medicine educators, social media platforms such as Instagram present a feasible method to reach additional learners, potentially reducing health equity disparities. It also may be an effective method to encourage engagement in lifelong learning in the field of nuclear medicine.

References

1. Shah V, Kotsenas AL. Social Media Tips to Enhance Medical Education. *Academic Radiology*. 2017;24(6):747-752. doi:10.1016/j.acra.2016.12.023

2. Omary, R. Social Media and Education in Radiology. *Academic Radiology*. 2018:25(6), pp.744-746.

3. Cabrera, D., Roy, D. and Chisolm, M., 2018. Social Media Scholarship and Alternative Metrics for Academic Promotion and Tenure. *Journal of the American College of Radiology*. 2018:15(1), pp.135-141.

4. Koontz, N., Hill, D., Dodson, S., Capps, A., Kamer, A., Frank, M. and Heitkamp, D. Electronic and Social Media-based Radiology Learning Initiative. *Academic Radiology*. 2018:25(6), pp.687-698.

5. Shafer, S., Johnson, M., Thomas, R., Johnson, P. and Fishman, E. Instagram as a Vehicle for Education. *Academic Radiology*. 2018:25(6), pp.819-822.

6. Statista. 2020. *English Proficiency In Latin American Countries 2018 | Statista*. [online] Available at: <https://www.statista.com/statistics/1053066/english-proficiency-latin-america/; English Proficiency Index for selected countries in Latin America in 2018(index score)> [Accessed 15 June 2020].

7. Drobac, P. and Morse, M. Medical Education and Global Health Equity. *Medical Education*. 2016:18(7):702-709.

8. Statista. 2020. *Instagram: Age Distribution Of Global Audiences 2020 | Statista*. [online] Available at: <https://www.statista.com/statistics/325587/instagram-global-age-group/> [Accessed 15 June 2020].

9. Hughes, B., Joshi, I., Lemonde, H. and Wareham, J. Junior physician's use of Web 2.0 for information seeking and medical education: A qualitative study. *International Journal of Medical Informatics*. 2009:78(10), pp.645-655.

10. Panahi, S., Watson, J. and Partridge, H. Social media and physicians: Exploring the benefits and challenges. *Health Informatics Journal*. 2014:22(2), pp.99-112.

11. Sk.sagepub.com. 2020. *SAGE Reference - What Is Social Media And What Questions Can Social Media Research Help Us Answer?*. [online] Available at: <https://sk.sagepub.com/reference/the-sage-handbook-of-social-media-research-methods/i605.xml> [Accessed 15 June 2020].

12. Social media benchmark report. 2020. [online] Available at: <https://www.rivaliq.com/blog/2019-social-media-benchmark-report/> [Accessed 15 June 2020].

FIGURE 1. Representative Instagram post focused on nuclear medicine education.

TABLE 1. Characteristics of formal and informal learning environments.

Formal learning environments	Informal learning environments
Systematic and structured	Less structured
Restricted to certain time slots	Available most any time
Led by instructor	Self- or student-directed
School, college or university	Outside of school, college or university

TABLE 2. Examples of nuclear medicine educational sites on Instagram.

Instagram Site	Geographic Origin	Number of Followers
@dr_nuclear	Israel	~2,760
@nuclear_medicine_jo	Jordan	~1,070
@nuclear_radiology	United States of America	~7,100
@nucmed_physicist	Indonesia	~1,250

TABLE 3. Age of followers on an Instagram site dedicated to nuclear medicine education.

Age	Percentage of followers
18-24 yrs	13.2 %
25-34 yrs	56.6%
35-44 yrs	21%
45+ yrs	9.2%

TABLE 4. Engagement analysis for representative post in Figure1.

Type of engagement	Number of actions
Likes	184
Comments	10
Shares	11
Saves	36
Profile visits	42
Follows	9
Total	**292**
Engagement Rate	292 ÷ 6,154 impressions = **4.7%**

SUPPLEMENTAL TABLE 1. Nationality of followers on an Instagram site dedicated to nuclear medicine education (United Nations Country Grouping).

Country of origin	Number of users	Percentage of users	Total
Africa Egypt Nigeria Morocco Algeria South Africa Libya Sudan	 78 47 34 33 32 25 21	 1.48% 0.89% 0.64% 0.63% 0.61% 0.47% 0.40%	 5.12%
Asia India Indonesia Pakistan Malaysia Philippines Singapore	 463 151 77 72 40 23	 8.77% 2.86% 1.46% 1.36% 0.76% 0.44%	 15.65%
Central America Mexico	 142	 2.69%	 2.69%
Europe United Kingdom Russia Turkey Ukraine	 196 179 129 48	 3.71% 3.39% 2.44% 0.91%	 10.45%
European Union Italy Spain Germany France Portugal Netherlands Romania Sweden	 99 79 68 37 30 27 27 24	 1.88% 1.5% 1.29% 0.70% 0.57% 0.51% 0.51% 0.45%	 7.41%
Middle East Saudi Arabia Iran Iraq Kuwait Jordan Oman United Arab Emirates Palestinian territories Israel Bahrain	 269 133 79 70 36 29 28 28 27 25	 5.10% 2.52% 1.5% 1.33% 0.68% 0.55% 0.53% 0.53% 0.51% 0.47%	 13.72%
North America United States	 1466	 27.78%	

Canada	139	2.63%	30.41%
Oceania Australia	103	1.95%	1.95%
South America Brazil Argentina Colombia Chile Venezuela Peru	381 75 70 61 49 29	7.22% 1.42% 1.33% 1.16% 0.93% 0.55%	12.61%