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Review Article

Social media, FOAMed in medical education and knowledge sharing: Local experiences with international perspective

Arif Alper Cevik [a, b, *], Gokhan Aksel [c], Haldun Akoglu [d], Serkan Emre Eroglu [d], Nurettin Ozgur Dogan [e], Yusuf Ali Altunci [f]

[a] United Arab Emirates University, College of Medicine, Emergency Medicine Clerkship, Internal Medicine, Al Ain, 17666, United Arab Emirates
[b] Department of Emergency Medicine, Eskisehir Osmangazi University, Turkey
[c] Umraniye Training and Research Hospital, Department of Emergency Medicine, Istanbul, 34764, Turkey
[d] Marmara University Pendik Research and Training Hospital, Department of Emergency Medicine, Istanbul, 34900, Turkey
[e] Kocaeli University, College of Medicine, Department of Emergency Medicine, Kocaeli, Turkey
[f] Ege University Faculty of Medicine, Department of Emergency Medicine, Izmir, Turkey

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ABSTRACT

Social media, through the Internet and other web-based technologies, have become a means of communication and knowledge-sharing. In this article, we provide details about the social media traffic of various scientific activities, the organizations of which we have played an active role in. We also provide information in our native language through our FOAMed website, which has been published for about 30 months, with us acting as editors. We are comparing these local and limited ventures with examples from the world and aim to remind that social media sources play a very important role in sharing knowledge in medical training and encouraging local initiatives, like ours, with limited resources.

1. Introduction

Nowadays, social media, through the Internet and other web-based technologies, has become a means of communication and knowledge-sharing. Social media is mostly used via mobile devices. One of the most important aspects of this new tool is its capacity to bring together geographically separate groups to a common platform. Among the most widely used methods are blogs, Twitter and similar microblogs, social networking sites like Facebook, Google Plus, as well as podcasts and videocasts that are used for individual content transmission.[1]

It is reported that the social media use, among medical faculty students in our country, amounts to 93.4%.[2] In this study, YouTube (97.3%), Facebook (95.3%), blogs (69.1%), and Twitter (68%) emerged as the most widely used social media environments. During the post-graduation period, both residents and specialists have a high social media utilization rate (90%), and half of those users access social media on a daily basis.[3] These rates may vary, depending on the area of specialization.[4] It is a well-known fact that today, Facebook and Twitter have over one billion users.[5,6] Many universities, hospitals, departments, courses, conferences, and educators make use of these environments for knowledge-sharing purposes. It is stated in a systematic review that the use of social media in education enhances knowledge, student attendance, feedback, professional development, and cooperation.[1] On the other hand, we have also witnessed recently how the Free Open Access Medical Education (FOAM) trend altered medical training and its sources of transmission via freely shared sources by using the possibilities offered by social media.[7,8] This contributes, in particular, to the professional development of students and teachers who have limited resources and who live in geographically distant regions, and naturally to the improvement of the service that the teachers are offering by allowing them to access information.[1,9,10]

In this article, we provide details about the social media traffic of various scientific activities, the organization of which we have played an active role in. We also provide information in our native language through our FOAMed website, which has been published

* Corresponding author. United Arab Emirates University, College of Medicine, Emergency Medicine Clerkship, Internal Medicine, Al Ain, 17666, United Arab Emirates.
E-mail address: aacevik@uaeu.ac.ae (A.A. Cevik).
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for about 30 months, with us acting as editors. We are comparing these local and limited ventures with examples from the world and aim to remind that social media sources play a very important role in sharing knowledge in medical training and encouraging local initiatives, like ours, with limited resources.

1.1. Case study 1, a local course

In 2008, the Academic Emergency Department of Eskisehir Osmangazi University, which was established just four years ago, previously created the Evidence-Based Emergency Trauma Management Course (In Turkish: Kanita Dayali Travma Yonetimi Kursu, KADAT, Twitter hashtag: #kadat2015) for Emergency Medicine residents and specialists in our country. Despite basically featuring theoretical and practical content, the training course was significant until 2014 in that it used to be presented on a semi-annual basis after being updated with novel information by emergency medicine specialists and academicians who underwent formal education on evidence-based medicine. Although this continuously updated training course drew great interest during the seven years that it was on offer, a format change was carried out in 2015 to adapt the existing social media sources to the course and to enhance knowledge sharing, interaction with participants, and professional communication. This change involved the reduction of the number of attendants from 30 to 20, the separation of attendants into four teams, and the introduction of mobile online voting applications (Socrative, etc.). In addition, it also brought along competition among teams via points to be collected in categories such as questions both before and after presentations, procedural skill reviews, and actively sharing knowledge gained during the course over Twitter. This was an unusual format for a training course that has not been tested in our country so far. This training course that used to be organized on a semi-annual basis for seven years with the attendance of a total of 60 persons and that implied no knowledge sharing on social media reached 7.407 tweets (#kadat2015) with 66 active Twitter users, of whom 25 were actual course attendants during the 3 days of training and from 24 through 28 May 2015, when it peaked in Twitter with its new format in 2015. The global impression created by this course, presented in the local Turkish language, amounted to 779.913, with 112 tweets per person and 66 tweets per hour.[11] This was a far larger effect than we expected and proof that social media platforms have an avalanche effect on knowledge sharing. In fact, the Facebook page established in late 2013 for the training course had 460 members at the end of 2014 and served only as a means of sharing schedule announcements and photos. Although no scientific content is being shared on the said Facebook page, 75 new member requests were approved during the 30 days following the format change, and the number of members increased to 535.[12] The comparison of the number of members acquired during two years and an increase of 16.3% in the number of members in the last 30 days with scientific shares from Twitter, despite sharing no scientific information on the site, is an indicator of how a social microblog may influence another social network.

1.2. Case study 2, a local symposium with international participation

The International Federation for Emergency Medicine (IFEM) is a federation bringing emergency medicine associations together. This organization generates policies to develop emergency medicine in the international arena, cooperates with local associations, issues guidelines for use by all countries concerned, and holds biennial international emergency medicine conferences. Apart from these conferences, the federation also aims to contribute to the development of emergency medicine as well as the awareness of emergency medicine via emergency medicine symposiums that are organized in various countries. One of these symposiums, the IFEM Trauma Update Symposium, was held in Abu Dhabi on 5–6 June of 2015, under the leadership of the Emirates Society of Emergency Medicine. The two-day symposium, in which concurrent sessions took place in two separate halls, was attended by over 400 local and foreign participants. An announcement was made on Twitter, with the “ifemtrauma” hashtag (#ifemtrauma) at the start of and during the symposium. On June 2 to June 9, 2015, the period when the symposium peaked at Twitter, 196 active Twitter users sent a total of 1473 tweets and reached a global impression of 718,535.[13] During this two-day local symposium, trauma data, and symposium presentations were shared all over the world, via Twitter, and transmitted, real-time, not only to the actual 400 participants but also to the thousands of professionals at hundreds of different locations around the world.

1.3. Case study 3: the first emergency medicine FOAM blog of Turkey: Acilci Net

Towards the end of 2012, when the FOAM movement started to blossom and gain momentum, the first Turkish FOAM blog was established under the name of Acilci Net (www.acilci.net) on 25 December 2012.[14] With support and information received on technical methods from the pioneers of FOAM movement, Chris Nickson and Mike Cadogan, Acilci Net was able to address most of the technical problems that it may encounter and was visited 3500 times during the first month of its existence. Although this was considered to be high among Emergency Medicine websites in Turkish at the time of its establishment, this figure has been the average daily number of visitors during the past two years.

After the establishment stage, Acilci Net was transformed into a large resource to which nearly 100 Emergency Medicine academicians and assistants contribute, among whom 19 are permanent and regular. Featuring more than 800 articles that consist of half a million words and have been read over a million times, Acilci Net has undoubtedly become the greatest educational source in Turkish in the field of emergency medicine.

There is no doubt that the key to reaching such a widespread audience is through social media, a cornerstone of today's communication technology. As soon as they are published, all articles are announced to the followers on Twitter, Facebook, and Google+ (1142, 1225, and 34 followers, respectively). Furthermore, an e-mail bulletin is sent to over 900 subscribers each morning and an RSS service transmits to RSS readers (557 followers). The training video clips on the website are archived and shared on Youtube and Vimeo. With over 1000 followers on Facebook and Twitter, which are two of the greatest among social media networks[14] Acilci Net has become one of the most followed Emergency Medicine blogs not only in the nation but also in the international arena. Also, the built-in automatic translation support enables users to translate and read each page in over ten languages. Featuring articles that are read more than 100,000 times among over 800 posted articles, the blog's most popular series is the ECG library that has been translated into Turkish via an agreement with the Lifeinthefastlane blog. The index page of this library received more than 30,000 clicks, while the article series covering over 100 ECG-related topics has achieved 300,000 views. Also, current guidelines such as cardiopulmonary resuscitation, hyponatremia, sepsis, etc., which are translated into Turkish as soon as they are published, are undoubtedly among the most-read articles. When considered from this viewpoint, we see that Acilci Net not only fills a gap with regards to online Turkish sources on ECG but also fulfills a great need by summing up and presenting the latest guidelines in Turkish.

As of 2015, www.acilci.net, which has grown by 700% in its first year and by 400% in its second, has become a website viewed by about 3000 Emergency Medicine specialists and assistants for 100,000 times per month. Thus, it can be said that each emergency medicine physician in our country is visiting www.acilci.net at least once per day on average. According to the results of a questionnaire carried out by residents during the Emergency Medicine Resident Symposium organized in 2014, Acilci.Net is the top educational resource preferred by assistants. The fact that www.acilci.net surpassed other well-known options with far more comprehensive contents made available in this questionnaire such as PubMed, UpToDate, and Medscape is proof that our residents are in need of reliable sources in their native language. With 89.4% of its visitors from Turkey, www.acilci.net was also visited by users from 111 different countries during the first half of 2015. Among these, USA, Azerbaijan, Germany, Britain, Russia, and Switzerland share the top ranks with thousands of visitors. The fact that the visitors from Azerbaijan, Macedonia, and Kazakhstan increased by 1000% in the last year is a critical indicator that a Turkish education blog may well be used by neighboring countries that can speak or understand the same language.

2. Discussion

These three examples serve to reveal the contribution to knowledge sharing of the use of FOAM and social media environments on a local basis. Despite being simple and local examples, the effect created on the international platform by each of these examples is demonstrated by facts and figures. These three examples are also significant in that they are proof that social media use is not only a social communication tool but also a free-of-charge and freely accessible resource contributing to training and professional development.

Up until 2012, social media used to play a relatively weak role in international emergency medicine meetings. During the International Conference on Emergency Medicine (ICEM) organized in 2012, only 15.6% of 212 speakers had a Twitter account whereas less than 10% had a blog. During this conference, a total of 4633 messages on ICEM2012 (#icem2012) were tweeted. Among those, 74.4% were about training materials.[15,16] The effects of social media on medical education and medical congresses became apparent through the Social Media and Critical Care (SMACC) conferences that have been organized since 2013.[17] Based on a thoroughly unusual concept, these conferences caused an expectedly great impact on the number of attendants growing each year and the perception they created across the globe.

The first ever SMACC was organized on March 11–13, 2013 in Sydney Convention and Exhibition Centre with 700 attendants. Here, healthcare professionals involved in critical care from all over the world shared their experiences.[17] This first SMACC meeting gave a unique experience for those interested in FOAM. At the same time, the fact that the meeting was a non-profit initiative organized without the support of a financial institution or professional sponsorship has also set an example for the FOAM movement. The second SMACC (#smaccgold) meeting, held on March 19–21, 2014, had 1300 attendants. This conference boasted a widespread attendance by those interested in critical care, including emergency medicine specialists, intensive care specialists, anesthetists, prehospital care specialists, critical care nurses, and paramedics.[17,18] The third SMACC meeting was held on June 23–26, 2015, at McCormick Place in Chicago. This considerably colorful conference was attended by over 2000 participants.[19] It was observed that, apart from the ever-growing number of attendants to SMACC conferences, the Twitter impression has also increased with attendants who are not actually present but who participate via Twitter.[20] This effect is one of the most specific instances showing that the influence of social media on knowledge sharing is increasing incrementally like an avalanche. Social media activities carried out at various congresses are summed up in Table 1.

One of the significant aspects is the integration of the organized scientific event with social media and the presentation of this fact as one of the cornerstones of said event. SMACC organizations are living proof of the efficiency of this point. Although this has not been established as the main goal and was not listed among the Congress' main themes, and nor were the Congress participants encouraged to make active use of social media, the fact that the International Conference on Emergency Medicine (#icem2014), organized in 2014 in Hong Kong and attended by over 2000 participants, attained an impression of 5,346,251 thanks to 4817 tweets by 1143 participants during the peak social media period from 6 through June 15, 2014, was considered to be an important accomplishment.[16] This may be reckoned as an indicator of how intimate today's congress participants are with social media and that a particular level of maturity is reached regarding knowledge sharing. Likewise, this also applies to the European Congress on Emergency Medicine (#eusem2014) organized in 2014. The

Table 1
Examples of emergency medicine congresses/courses and twitter activities from over the world.

Congress and course hashtags	Year	Active twitter Participants	Number of tweets	Impressions
smaccus	2015	5113	79,911	126,718,308
acep14	2014	2497	18,519	32,485,874
smaccgold	2014	1678	22,406	22,693,470
smacc2013	2013	1323	11,947	15,194,004
ıcem2012	2012	409	4644	8,340,748
ıcem2014	2014	1143	4817	5,346,251
eusem2014	2014	910	6955	5,287,743
acep12	2012	294	1597	3,699,322
ıemtc12[a]	2012	114	1053	3,477,045
caep2014	2014	379	3215	3,268,033
acem2012	2012	265	2701	2,474,964
ıemtc13[a]	2013	193	976	1,204,736
aceptf13[a]	2013	78	477	972,872
kadat2015[a]	2015	68	7420	783,376
ifemtrauma	2015	196	1473	718,535
acem2014	2014	155	543	576,541
esem2014	2014	123	1104	489,143
afcem2014	2014	107	770	428,176

Please visit symplur.com for detailed information about the hashtags and the Twitter activities of related congresses.
[a] Courses.

impression of 5,287,743 created via 6955 tweets by 910 active Twitter users was an incredible step for European congresses.[21]

In fact, the first important measures for the use of social media or emergency medicine congresses were made during the ICEM2012 (#icem2012) congress organized in 2012 in Dublin. Here, 409 active Twitter users reached an impression level of 8,340,748 with 4633 tweets and caused the Congress create a tremendous impression throughout the world.[16] Unfortunately, we must express that emergency medicine congresses organized in Turkey are not following this trend. Despite being relatively successful, the Eurasian Congress on Emergency Medicine (EACEM), hosted on a biennial basis since 2008, and the Turkish Emergency Medicine Congress (TATKON), to be organized for the 10th time this year, had little or no representation impacting on social media during 2012–2014 or previously. This is also true for other scientific Emergency Medicine meetings organized in our country. On the other hand, we must add that we are hopeful for the EACEM2016 scheduled in 2016.

Despite having a brief history, the number of FOAM websites is growing rapidly with each passing day. For this reason, it is virtually impossible to make an exhaustive list of all FOAM websites. The addresses and contents of the most popular FOAM websites are listed alphabetically in Table 2. There is no doubt about the strong possibility of the existence of tens of other FOAM websites not listed hereunder or in the establishment phase.[7] Some of the FOAM websites enjoy international popularity and a substantial number of visitors while others are only influential on a more local basis. Establishing the optimum method to identify which of these websites are most efficient is debatable. Despite being controversial, regarding the extent, they reflect the quality, and the impact factor values, calculated by the number of references to articles featured in scientific journals, are still in use as a relatively objective measurement system, indicating the related journal's quality and visibility in academic circles. It is arguable whether it would be accurate or possible to make use of a similar impact measurement for FOAM websites. The ranking, carried out by some websites, such as Alexa.com, Google PageRank, etc., by data, about the number of visitors and the number of pages viewed, on the website, by each visitor may be preferred as a method of measuring the efficacy of FOAM websites. However, this measurement may fall short in assessing the number of persons that a website may access as not only the number of clicks but also the number of shares in social media, of an article featured on the website, is important in the social media era. In other words, to measure the number of persons reached by an article, it is not sufficient to look at the number of viewings in the website, in which the article is featured. It would be

Table 2
Top FOAMed website worldwide and their contents.

Website name and URL	Content
Academic life in emergency medicine http://www.aliem.com/	A US-based website containing all topics and training materials on emergency medicine.
Acilci.net http://www.acilci.net/	An emergency medicine website based in Turkey, covering all emergency medicine topics and literature and featuring video training materials.
Emergency ECG Video of the Week (Amal Mattu) http://ekgumem.tumblr.com/	Features talks on video of a world-renowned emergency cardiology expert and educator
Boring EM http://boringem.org	A Canadian-based blog featuring the less favorite topics of emergency medicine.
BroomeDocs http://broomedocs.com	A website with a general medical practice content that may of great interest to emergency medicine professionals.
Critical care reviews http://criticalcarereviews.com	A website with a comprehensive content on critical kept that is continuously kept updated.
Don't forget the bubbles http://dontforgetthebubbles.com	A website targeting pediatricians and known with its questions & answers and case based content. Mostly features cases of children in emergency service.
Dr Smith's ECG blog http://hqmeded-ecg.blogspot.com.au/	A blog where examples of ECG are interpreted by an ECG expert.
ECG & cardiology http://ecg-experts.blogspot.co.uk/	A comprehensive ECG training website addressing a wide audience from beginners to experts.
EM basic http://embasic.org/	A blog for medical students mostly relating emergency medicine cases.
EM Nerd http://emnerd.com	A website featuring interesting and illuminating articles from the emergency medicine literature.
EMCrit blog http://emcrit.org/	Features topics on critical care in emergency medicine.
Emergency medicine Ireland http://emergencymedicineireland.com/	An Irish blog on emergency medicine.
Emergency medicine literature of note http://www.emlitofnote.com	A blog featuring emergency medicine literature
EMPEM.org http://empem.org/	An Australian-website featuring podcasts where emergency service pediatric topics are discussed.
Ercast http://blog.ercast.org	A blog on emergency medicine.
ERCAST http://blog.ercast.org/	Features podcasts by the American emergency medicine specialist Rob Orman.
Free emergency medicine talks http://freeemergencytalks.net/	Features a comprehensive voice recording archive of Joe Lex recorded during Emergency Medicine and Critical Care Congresses throughout the world.
Geeky medics http://geekymedics.com/	A website that covers not only emergency medicine topics but also all general medical topics and that mostly targets medical students
Impacted nurse, http://impactednurse.com/	The website is not accessible as of 07.07.2015

(*continued on next page*)

Table 2 (*continued*)

Website name and URL	Content
iTeachEM.net http://iteachem.net/	A website with content established by Rob Rogers and featuring training material for clinic trainers.
Intensive care http://intensivecarenetwork.com/	A blog featuring articles and podcasts on critical care.
Kangaroo Island doc http://kidocs.org/	A blog featuring medical subjects in the rural areas of Australia.
Life in the fastlane http://lifeinthefastlane.com/	A comprehensive emergency medicine FOAM website featuring the entire emergency medicine and critical care topics.
Pediatric EM morsels http://pedemmorsels.com/	A US-based, comprehensive emergency pediatrics blog.
PHARM http://prehospitalmed.com/	An Australian-based blog featuring pre-hospital medical topics and related podcasts and mainly airway management issues.
Presopital research http://prehospitalresearch.eu/	A website featuring pre-hospital topics and aiming to bring researchers together.
Resuscitaionist's awesome guide to everything http://ragepodcast.com/	A website featuring podcasts on critical care.
Resus.ME http://resusme.em.extrememember.com/	A website featuring the most current studies on resuscitation.
Skeptics guide to emergency medicine http://thesgem.com	A Canadian website where emergency medicine literature is discussed comprehensively and shared via podcasts.
SMACC podcast on intensive care network http://www.intensivecarenetwork.com/index.php/icn-activities/smacc-2013/podcasts	A website featuring speeches from SMACC conferences.
SMART EM http://www.smartem.org	A New York–USA based website sharing literature discussions via podcasts.
Sonocave http://thesonocave.com	An Australian blog offering high-quality ultrasound education resources.
Sonospot http://sonospot.wordpress.com	A USA-based website about ultrasound
StEmlyns http://stemlynsblog.org	A blog featuring all topics of emergency medicine established by Simor Carley, one of the founders of Bestbets.org.
The poison review http://www.thepoisonreview.com/	A USA-based website featuring literature discussions on toxicology.
The trauma professional's blog http://regionstraumapro.com	An American website on trauma management.
TJDogma http://tjdogma.com	A training blog on emergency medicine
Ultrasound podcast http://www.ultrasoundpodcast.com	An entertaining website featuring podcasts on ultrasound.
UMEM education pearls https://umem.org/educational_pearls	A website based in Maryland University and featuring educational information on tablets.

a more accurate method to take additionally into account the level of sharing on social media of the article in question. To this end, not only measures such as visiting frequency as available in alexa.com, but also criteria such as how many times the website and its contents are shared, followed, or liked in social networks such as Facebook or Twitter, etc. must be used. These measures may either be utilized separately or placed in a particular formula to calculate the Social Media Index (SMi) score and to establish the impact of a FOAM website. The editors of one of the FOAM websites in question – Boringem.org – made use of SMi for FOAM websites for the first time and published the FOAM websites ranking list based on this formula.[22,23]

Top FOAM websites are ranked by alexa.com data, Facebook and Twitter following rates, and SMi data.[22,24] The top three websites according to the Alexa – Actionable Analytics for the Web[24] ranking are Life in the fast lane (LITFL,[27]), Academic Life in Emergency Medicine (ALiEM,[28]), and Emergency Medicine and Critical Care (EMCrit,[29]); whereas the Facebook likes ranking lists the top three as ECG Expert Study Cards (ECG ESC), EMS 12 Lead[30] and ALiEM (See Table 2 for details about websites). When Twitter followers are considered, LITFL, EMCrit, and EMS 12 Lead share the top three places. The calculation of SM-i scores places the LITFL as the top website, with a score of 9.4, while ALiEM and EMCrit follow, with 8.89 and 8.68, respectively. According to the data, used for ranking purposes, that was available in January 2014, the list of most frequently visited FOAM websites, according to current alexa.com data, may have been altered in time.

With 10.6% of its visitors from abroad, www.acilci.net is ranked, by Twitter followers and Alexa visitor data, as the top 50 international FOAM blogs throughout the world and, according to Facebook follower data, is among the top 15.[24] Having an SM-i value of about 4,5 when calculated by SM-i[22] formula, www.acilci.net can be said to be among the 25 most efficient FOAM websites worldwide.[25] Although the fact that Thoma's lists take account of websites only published in English prevents us from learning about how efficient FOAM sites in local languages are throughout the world, we are not aware, at this point in time, of any other FOAM website of this rank that is published in a language other than English. However, we are of the opinion that the awareness, created by Acilci Net in the international arena, is recognized by the fact that the website is invited to the 2014 European Society of Emergency Medicine Congress in Amsterdam and the International Conference on Emergency Medicine Congress in Hong Kong.

According to the 2015 analyses of a global agency, the number of active social media accounts throughout the world increased by 12% when compared to 2014 and attained the 2.078 billion level.[26] Although we have not been able to come across any finalized data on the effect of this increase in the number of accounts on the prevalence of educational use, it is reported in literature that a positive viewpoint is attained by sharing educational data with users who do not make use of sharing tools such as Facebook.[27,28] It is even suggested in a study published in 2010 that online continuous medical education will increase by 50% by 2016.[29,30] Apart from such training, healthcare professionals may access wide

audiences in their communications with the public, patients, and their relations by making efficient use of social media, enhancing their social and professional connections, sharing information, and educating people. Likewise, Youtube and other media-sharing websites may feature channels that can be considered as veritable encyclopedic resources for clinicians.[31]

Despite all these, social media is also open against misinformation, security gaps, and copyright issues.[32,33] Similarly, in a recent study, it was reported that medical students failed to attain the ideal in ethical and professional social media use and that lecturers are facing problems in education on this subject.[34] We believe that the social media environment will develop in a controlled and healthy manner thanks to guidelines standardizing this new open-access training media.

Social media tools offer a chance to encourage learning on cooperation and collaboration. Evidence of the contribution of social media tools to medical training is growing day by day. Making use of social media during the evolution of medical training technology is a logical step in terms of enhancing learning. It is an undeniable fact that the net definitions of social media technologies and their components will be required in the future to ensure academic comparisons and data synthesis in this new field.[1]

Another undeniable fact is the value of medical journals for professional development. In order to survive in the future, it is inevitable for these journals to keep pace with the evolution of social media. This training and the sharing of FOAM with the social media is also expected for scientific journals. For this reason, full adaptation and integration with Internet technologies and social media properties are seen as necessary to ensure that the journals stay standing, and that medical knowledge is spread more accurately and rapidly than ever before.[35]

It is being expected throughout the world that the scientific value of the FOAM notion will be recognized in the academic circles with an ever-increasing rate.[7] This will be brought along by the capacity to establish quality measures and effect analyses (impact factors).[10] The coming days are heralding a time when FOAM will turn into a high standard, and it is anticipated that this trend is capable of altering and reshaping education worldwide.[36]

Conclusion The FOAM trend and social media tools paved the way for allowing today's teachers and students to have rapid and reliable access to information anywhere in the world. The contribution made by the local examples that we have shared hereunder to the sharing of knowledge on a regional or international basis is promising. This global effect will be shaped not by the magnitude of the activity but by the use of social media by those participating in and following the said activity with the purpose of sharing accurate knowledge. In addition, because there is no clear evidence to show whether the FOAM and social media change clinical practice and improve education or not, we need assessment tools to understand the effect of FOAM and social media on those outcomes.

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