Original Article

#FOAMems: Engaging paramedics with free, online open-access education

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Abstract:

BACKGROUND AND AIM: Twitter® use among paramedics and other prehospital care clinicians is on the rise and is increasingly being used as a platform for continuing education and international collaboration. In 2014, the hashtag #FOAMems was registered. It is used for the sharing of emergency medical services, paramedicine, and prehospital care-related content. It is a component of the 'free open-access meducation' (FOAM) movement. The aim of this study was to characterize and evaluate the content of #FOAMems tweets since registration.

MATERIALS AND METHODS: An analytical report for #FOAMems was generated on symplur.com from February 4, 2014, to April 30, 2017. A transcript of all #FOAMems tweets for a randomly selected 1 month period (October 2015) was generated, and quantitative content analysis was performed by two reviewers. Tweets were categorized according to source (original tweet/retweet) and whether referenced. The top 92 tweeters were analyzed for professional identity.

RESULTS: During the study period, there were over 99,000 tweets containing #FOAMems, by over 9,200 participants. These resulted in almost 144 million impressions. Of the top 92 tweeters, 50 were paramedics (54%). Tweets were mainly related to cardiac (23%), leadership (19%), and trauma (14%). The 1-month period resulted in 649 original tweets, with 2110 retweets; 1070 of these were referenced.

CONCLUSION: Paramedics are engaging with both clinical and nonclinical content on Twitter® using #FOAMems. Social media resources are widely shared, which is in line with the FOAM movement's philosophy. However, opportunities exist for paramedics to share further diverse resources supported by referenced material.

Keywords:

Education, online, paramedic, social media, twitter

Introduction

Social media use among paramedics and other clinicians involved in prehospital care is on the rise, and these platforms are increasingly being used for continuing education and international collaboration. The use of educational blogs and podcasts has increased dramatically in the past decade[1] as educators aim to empower lifelong learning in trainees.[2-5] Traditional sources of education including textbooks and peer-reviewed journals present difficulties to many student paramedics and educators – they are expensive and difficult to access.[6] These publications also present information that was up-to-date when published but may now be out of date or even refuted.[6,7] Open-access resources have the potential to address these limitations because they can be published quickly and are easily updated and edited.[5,8] There has been a cultural shift to democratized publishing,[8-11] away from publication houses held behind paywalls, and into the hands of anyone with access to the Internet. The use of medical websites plays a prominent role in facilitating new styles of education currently being adopted within the field of paramedicine.[11,12] Blogs, podcasts, live video, Twitter, and other digital resources have become increasingly

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popular platforms for learning and collaborating, as evidenced by their exponential growth within the field of prehospital care.

Research into the impact that social media learning can have in the paramedic education setting has only just begun in earnest;[12-15] however, previous studies within other health-care professions have shown promising results.[16-19] Current literature demonstrates that emergency medicine and critical care have led the way in the explosive growth of these resources,[20] but there remains a lack of evidence proving the effectiveness and quality of the resources that are being utilized for prehospital education.

The 'free open-access meducation' (FOAM) community is involved in the sharing of resources including links to blogs, podcasts, and other freely accessible educational materials. The FOAM community has developed due to an underlying philosophy that medical education resources should be freely accessible to clinicians and educators alike.[1] There is no doubt that this concept existed before the advent of the FOAM movement proper; however, recent years have seen the FOAM movement and identity grow exponentially, and more resources than ever including podcasts, blogs, vodcasts, and even textbooks have been shared as FOAM content. Free open-access resources vary in content and may be referenced, registered with academic institutions, peer-reviewed, and in certain cases, provide continuing medical education credit.[5] FOAM resources deliver important information in a timely and digestible manner with ease of access, frequent updates, and real-time feedback from a worldwide audience.[5] Modern trainees and educators value accessibility and an asynchronous learning model,[5,21,22] while contemporary organizational and learning theories highlight learning and behavior as being influenced by social networks.[23]

The sharing of this free content is core to the continued development of the FOAM community, and Twitter® (Twitter Inc., CA, USA) is often considered the primary vehicle for distribution of FOAM material. The hashtag "FOAMed" (#FOAMed) can be added to tweets sharing free open-access medical education content, which allows them to be rapidly identified by a search for the hashtag. Specialty hashtags emerged early in the FOAM movement development to allow for refinement of sharing. For example, "FOAMcc" is used to categorize critical care content, "FOAMtox" is used when sharing toxicology information, and "FOANed" is used by colleagues in nursing to identify nursing specific information. Examples of some FOAM hashtags are contained in Table 1.

In 2014, the hashtag "FOAMems" (#FOAMems) was registered with the Healthcare Hashtag Project at

Table 1: Examples of free open-access medical education specialty hashtags

Hashtag	Focus/target material
FOAMed	Medicine and medical sciences
FOAMped	Pediatric medicine
FOAMus	Ultrasound in clinical settings
FOAMog	Obstetrical and gynecological medicine
FOAMrx	Pharmacology
FOAMcc	Critical care and intensive care medicine
FOAMtox	Toxicology medicine
FOAM4gp	General practice/family medicine
FOAMlit	Free open-access published literature (much related to studies investigating FOAM resources)
FOAMim	Internal medicine
FOANed	Nursing

FOAM: Free open-access medical education

symplur.com.[24] It is designed to be used by clinicians who are involved in the sharing of clinical and other material related to emergency medical services, paramedicine, and prehospital care. It is part of the overall FOAM movement and is a "specialty" hashtag similar to those listed above.

Aim

The aim of this study was to characterize and evaluate the content of #FOAMems tweets in the first 3 years of operation. We were particularly interested in discovering what type of clinicians utilized the hashtag, the content that was shared, and whether the use of the hashtag aided in the distribution of referenced material to prehospital care clinicians.

Materials and Methods

A retrospective study was conducted whereby an analytical report for #FOAMems was generated on symplur.com, with a search date from February 4, 2014 (registration date of hashtag), to April 30, 2017, a total period of 39 months.

A transcript of all tweets containing the hashtag for a randomly selected 1 month period (October 1 – October 31, 2015) was created. Reports for this 1-month period were also generated on both symplur.com and followthehashtag.com. Data from both reports were used to obtain the results.

Quantitative content analysis was then performed, whereby all tweets were reviewed with the goal to describe trends in the tweet content. Tweets were analyzed and themes (topic of tweet) were identified. Tweets were also categorized based on source (original tweet or retweet [RT]) and whether they were referenced or not (contained a direct link to peer-reviewed material or a link to a FOAM resource which was then referenced appropriately). A RT was

defined as sharing of another user's tweet without modification of tweet content. A modified tweet (MT) is defined as a tweet that retains the meaning of the original tweet in full, but the wording has changed.[25] In other words, the link to content in the tweet (blog and video) usually remains unchanged, but the message may change depending on target audience. MTs were categorized as a RT with no separate designation.

The top 92 tweeters of #FOAMems over the 39 month period were analyzed on several occasions for professional qualification or identity by analyzing their Twitter® biography and other social media accounts. This number was selected based on the data supplied by the symplur.com report. This study was a review of publicly available data and thus was exempt from ethics requirements.

Results

During the study period (February 4, 2014 – April 30, 2017), there were over 99,000 tweets containing the hashtag #FOAMems, generated by over 9,200 participants. These tweets resulted in almost 144 million impressions. An impression is defined by Twitter® as "times a user is served a Tweet in timeline or search results."[26]

Of the top 92 tweeters (as per symplur.com report), 50 were paramedics (54%). Over the 1-month study period, tweets containing the hashtag #FOAMems were mainly related to cardiac (23%), leadership (19%), and trauma (14%) content [Table 2].

The 1-month study period (October 2015) resulted in 649 original tweets containing the hashtag FOAMems, with 2110 retweets or modified tweets in the same period. A total of 1070 of these tweets were referenced to identifiable reference material [Figure 1].

The geolocation report from followthehashtag.com for the 1-month period of October 2015 indicates that FOAMems material is shared by individuals worldwide, as illustrated by the distribution map in Figure 2.

Discussion

It is perhaps not surprising that some of the most shared content with the FOAMems hashtag during the period studied was related to cardiology, cardiac emergencies, and trauma. Several of the most active accounts in the prehospital and emergency care scene on Twitter® are related to the interpretation of electrocardiograms and the provision of clinical care to cardiac emergencies. This is likely reflective of the role of the "standard" paramedic curriculum internationally, which is broadly focused on clinical intervention for life-threatening conditions, particularly those of a cardiac, respiratory, and trauma

Table 2: Content analysis of tweets during October 2015

Category	n (%)
Cardiac	638 (23)
Leadership/education	531 (19)
Trauma	381 (14)
ECG	256 (9)
Airway/respiratory	212 (8)
Pediatric/neonatal	137 (5)
Capnography	91 (3)
Spinal motion restriction	73 (3)
HEMS	69 (3)
Environmental	62 (2)
Psychological/behavioral	57 (2)
Ultrasound	52 (2)
CVA/TIA	41 (1)
Sepsis	35 (1)
Community paramedicine	28 (1)
Fluid therapy	26 (<1)
Infectious disease	20 (<1)
Geriatrics	16 (<1)
Smartphone technology	15 (<1)
Other (single occurrence)	19 (<1)

HEMS: Helicopter emergency medical service, ECG: Electrocardiograms, TIA: Transient ischemic attack, CVA: Cerebrovascular accident

etiology. It was interesting to note that leadership/education content was shared so often during the study period, indicating that other aspects of professional practice are potentially coming to the fore. The prevalence of paramedics in the "top tweeters" list is encouraging and indicates that paramedics are actively engaging with the consumption, creation, and sharing of FOAM content.

Social media-facilitated learning is an important and powerful tool for paramedics and prehospital clinicians for many previously identified reasons, including facilitating self-directed learning during "downtime" and allowing professionals the ability to plan their own learning, facilitating differing levels of clinical practice and competency.[12] Paramedic education programs increasingly have their own social media accounts which are used not only to share program specific news and information but also to share content that is relevant and applicable to students and faculty. In addition, paramedic students in programs worldwide are now being encouraged to share FOAM content on social media as part of the learning and evaluation process.[27]

The ability to widely disseminate research findings has never been easier thanks in part to social media, and in particular platforms such as Twitter®, which allow for rapid sharing of content with large audiences. This sharing power does not come without responsibility, and the user needs to approach sharing information with caution – it is just as easy to disseminate inaccurate or false information.[9] This study highlights the need for

consumers of FOAM content to critically evaluate any content that is shared online or in other formats. Only 39% of content reviewed in this study contained a link to material that could be identified as "referenced." Therefore, the accuracy and validity of material for the remaining 61% of content is unreliable.

The wide geographical reach of material tagged with #FOAMems in this study was an interesting observation. This potentially allows for content created for one setting to be accessed, adapted, and reproduced for a different setting, reducing duplication of effort and encouraging international cooperation in prehospital education. The geographical distribution also highlights that clinicians in developing countries are making use of FOAM resources, potentially related to some of the issues highlighted earlier surrounding use of traditional

learning resources such as textbooks – they can be cost prohibitive, difficult to access, and may not represent latest evidence-based practices. This puts a further responsibility on those creating and sharing FOAM content to ensure that the information shared is valid, accurate, and appropriately referenced.

This study helps to inform learners, educators, and content producers about the type of content that is being shared by users on Twitter®. Its findings should stimulate discussion regarding the use of #FOAMems materials within educational programs and promote critical appraisal of FOAMs.

Limitations

This was a study of tweets that contained the hashtag "FOAMems." These likely do not represent all of the conversations within this hashtag; however, as many replies to tweets omit the hashtag but may contain other important information such as referenced material, links to other material, and relevant discussion.

An auto-RT account (@FOAMems) does exist, which automatically retweets any tweet that contains the hashtag FOAMems. This account had over 3,600 followers at the time of writing. While the automatic retweeting of tweets may artificially inflate the RT count, it does potentially expose these tweets to unique users, thus creating new impressions.

We defined "referenced" within this study as a tweet that was linked to material which was a primary or secondary source of referenced material. This included links directly to peer-reviewed journal articles (primary sources) and blogs and websites which provided references within
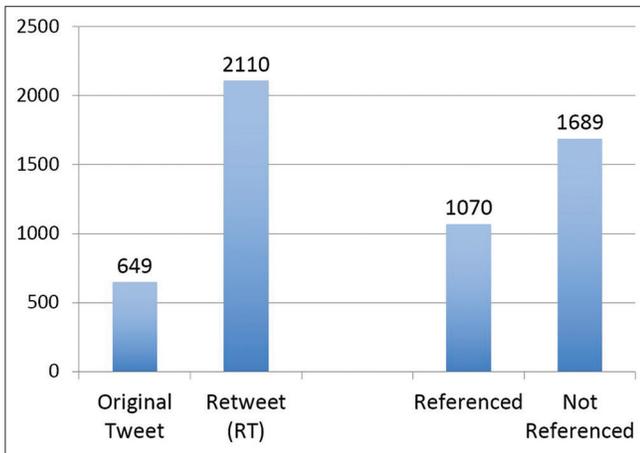

Figure 1: Tweet source (original or retweet/modified tweet) and reference status (referenced or not referenced) (*n* = 2759)
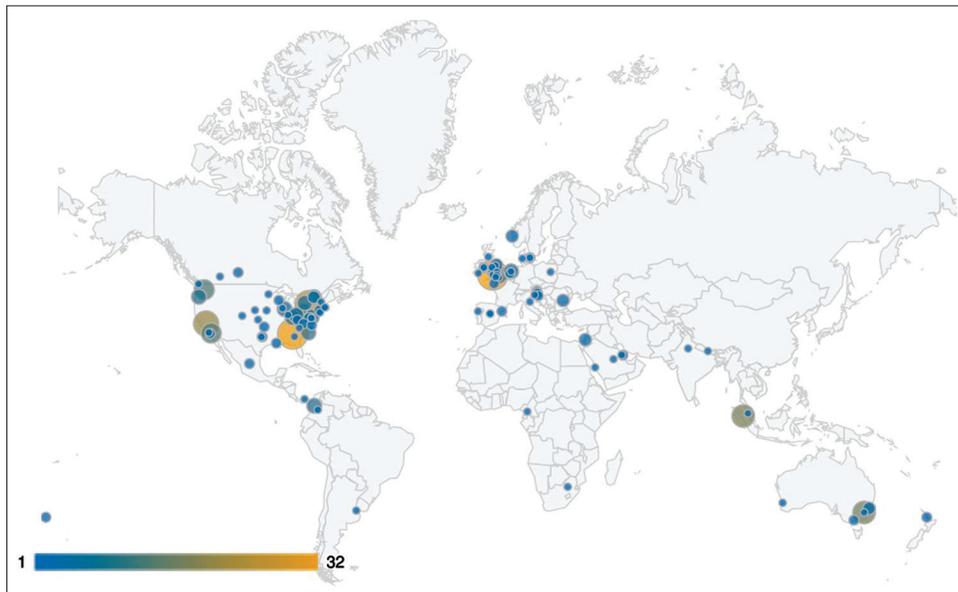

Figure 2: Location of FOAMems tweets during October 2015

their writing (secondary sources). Secondary sources generally describe, discuss, interpret, analyze, evaluate, or process primary sources. The use of secondary sources as evidence carries its own inherent risks regarding validity, reliability, and accessibility that users need to be aware of when appraising the content they are viewing.

Conclusion

Paramedics are engaging with both clinical and nonclinical content on Twitter® using #FOAMems, with the majority of tweets relating to clinical issues. Social media resources are widely tweeted and retweeted, which is in line with the FOAM movement's philosophy. Opportunities exist for paramedics to share further clinical, educational, and technical knowledge with peers and colleagues globally, in particular, content that is supported by referenced peer-reviewed primary source material.

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Conflicts of interest

AB registered the FOAMems hashtag. This work was not supported or funded by any drug company. Each author of this paper has completed the ICMJE conflict of interest statement**.**

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