Editorial Processes in Free Open Access Medical Educational (FOAM) Resources

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ABSTRACT

Background: Much of the skepticism toward online educational resources (OERs) in emergency medicine (EM) stems from the low barrier to publishing and a perceived lack of editorial rigor. Learners and educators have demonstrated unreliable gestalt ratings of OERs, suggesting a lack of capacity to consistently appraise these resources. The development of tools to guide clinicians and learners in the selection and use of blogs and podcasts is a growing area of interest. Disclosure of editorial process was identified in previous studies as an important quality indicator for OERs. However, little is known about editorial process in online EM resources and whether it can be reliably integrated into a critical appraisal tool.

Methods: Two reviewers assessed 100 top EM and critical care OERs for mention and description of editorial process and academic and nonacademic affiliations. Ninety-two sites were accessible for review. All sites were also contacted to attempt clarification of their editorial process. Inter-rater reliability for mention and description of editorial process was evaluated using Cohen's kappa, and the relationship between academic affiliation and disclosure of editorial process was assessed by odds ratio (OR).

Results: Eleven sites mentioned an editorial process, and 10 of these sites included a description. Five of the seven sites that responded to contact also described an editorial process. Inter-rater agreement was excellent for mention ($\kappa = 0.90$) and description ($\kappa = 1.00$) of editorial process. Eighteen sites listed academic affiliations and 21 sites had nonacademic affiliations. A greater proportion of sites with academic affiliations disclosed their editorial process compared to sites without academic affiliations (OR = 5.3, 95% confidence interval [CI] = 1.3–21.0; difference in proportions of 0.40, 95% CI = 11.6–60.8).

Conclusions: Although transparency is lacking, editorial processes exist among OERs. Inter-rater reliability for disclosure of editorial process is excellent, supporting its use within critical appraisal tools.

Over the past decade, the rapid proliferation of blogs and podcasts has inextricably changed medical education and knowledge sharing between trainees, clinicians, and researchers.^{1–5} In medicine, the growth in online educational resources (OERs) has taken shape under the banner of the Free Open Access Medical Education (FOAM) movement, and the integration of social media within the FOAM

movement has established an engaged interactive network of content creators and users.^{1,6,7} Learners have gravitated toward online resources, and recent surveys have shown widespread use of OERs for self-study by emergency medicine (EM) trainees in North America and integration of OERs into formal curricula in graduate medical education programs.^{8–12} OERs are highly accessible and are rapidly produced, better reflecting

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the ever-changing landscape of medical evidence.^{1,2} The FOAM movement has the potential to accelerate knowledge translation and improve patient care and clinician engagement with research.^{1,2,13}

However, there is no formal oversight for many FOAM resources, and OERs are often criticized for their deviation from traditional editorial processes and their lack of peer review prior to publication.^{14–16} Gestalt assessment of OERS such as blogs and podcasts has been shown to be notoriously inconsistent,^{17,18} suggesting that readers should be taught to critically appraise these resources.

Critical Appraisal for Online Resources

Critical appraisal of primary literature is well-integrated into medical education and numerous tools (e.g., the *JAMA User's Guide*) exist to support learners and clinicians in the judicious selection and use of literature.^{19,20} The development of tools to appraise resources like blogs and podcasts is still a nascent field,^{21–24} and there has been far less education for clinicians and trainees in their critical appraisal of OERs prior to use. Learners have therefore struggled to identify which online resources are trustworthy and reliable, and educators have faced similar challenges when recommending resources for use.^{17,18}

To fill this gap, a group of investigators reviewed the literature to generate a list of quality indicators for OERs.⁷ This list was subsequently whittled down via a series of modified Delphi processes (incorporating perspectives of educators and FOAM creators).^{25,26} Two critical appraisal tools, the METRIQ tools (METRIQ-5 and METRIQ-8), were developed based on these aforementioned studies to aid clinicians and trainees in assessing the quality of OERs.⁶

Editorial process emerged as a key quality indicator during the Delphi process and development of the METRIQ tools. Both Delphi studies identified credibility as one of the three main quality domains.^{25,26} Participants agreed that important indicators of credibility included independence of editorial process, transparency about the individuals and process behind content creation, and transparency about the intent underlying the content.^{25,26} Editorial process also contributes to two aspects of the METRIQ-8 scoring system: whether an editorial process is present and whether an outline of the editorial or peer review processes is included.⁶ Disclosure of editorial process can support the assessment of these aspects of credibility by clarifying who is involved in creating and revising

the resource, their qualifications, whether the content is subject to internal or external review, and whether content is intended as opinion or fact.^{8,22,25,26} Editorial process is therefore an important quality indicator that can help users appraise multiple domains of credibility and accuracy.

However to date, there has been no formal audit of the editorial landscape for blogs and podcasts. Disclosure of editorial process is not routine in OERs, and editorial processes can range from personal opinions of a single author to formal prepublication peer review.^{2,16,27} There is also a lack of information about other factors that can influence credibility, such as affiliations with academic and nonacademic institutions. If editorial process is to play a central role in new critical appraisal tools, it is vital to improve understanding of the disclosure and types of editorial processes in OERs and explore whether transparency can be reliably assessed.

The primary objective of this study was to evaluate the transparency and characteristics of editorial processes in EM and critical care online medical educational resources. The study also aimed to determine whether editorial processes could be reliably determined by two individual raters and whether site affiliations influenced disclosure of editorial process.

METHODS

This study was granted an exemption from review by the Hamilton Integrated Research Ethics Board.

Data Collection

One-hundred top EM and critical care online resources were identified using the Social Media index (SMi version date—October 2016).²⁸ The process of data collection is outlined in Figure 1.

Two independent reviewers (one medical student and one resident) visited each site between December 1, 2016, and January 31, 2017, and assessed whether an editorial process was mentioned and, if so, whether it was described. Data were collected using a binary approach, with either a “yes” or “no” assigned by each reviewer for the mention and description of an editorial process. If an editorial process was described, the number of different editorial processes and a copy of the description were also recorded. The reviewers also recorded all academic and nonacademic affiliations listed on each site.

After the collection of data to meet the primary objective of assessing disclosure and description of

Figure 1. Flow chart of data collection on editorial process for the top 100 emergency medicine and critical care online educational resources.

editorial process, all sites were contacted to offer an additional opportunity to describe their editorial process and confirm whether their editorial process was available online. The reviewers separated eight sites that referred to an editorial board without mentioning or describing an editorial process, and these sites were individually contacted to resolve the ambiguity created by reference to an editorial board without any mention of an editorial process. Three attempts were made to individually contact these sites via e-mail or listed social media (e.g., Facebook, Twitter) asking about the role of their editorial board and for a description of the process and whether it was accessible online. Initial contact was by the medical student, escalating to the resident and finally the senior author for sites that did not respond. Attempts were made to contact all remaining sites ($n = 84$) by a survey created using Google forms to confirm whether any sites had an

editorial process that they had not disclosed. The survey inquired about their editorial process, whether they had an editorial board, about the board's role, and whether a description of the editorial process could be found online. This survey was administered multiple times and via multiple contact points (each site was emailed at least twice) and a third attempt via alternative contact methods were also utilized in an attempt to maximize response rate (e.g., website-based forms, institutional e-mails of lead editors, and social media messaging via Facebook messaging of pages or Twitter direction).

Data Analysis

The reviewers' individual results for all sites were merged by consensus. Inter-rater reliability was evaluated to help assess whether including transparency in editorial process in a critical appraisal tool would be

feasible. Cohen's kappa (κ) was calculated to assess for separate inter-rater agreements for whether an editorial process was mentioned and whether one was described using the reviewers' individual yes/no scores for each item. Cohen's kappa was performed on 92 of the 92 sites included for review for both mention and description of an editorial process.

The relationship between academic affiliations and disclosure of editorial process was assessed through calculation of an odds ratio (OR) and a comparison via a Fisher's exact test. It was also assessed by comparing the proportion of sites with academic affiliations that disclosed their editorial process to the proportion that did not. Finally, the relationship between the mention of an editorial process and the website's SMi ranking was determined by applying the Mann-Whitney U-test.

RESULTS

As shown in Figure 1, a total of 100 sites were screened, with 92 sites included in the study. At the time of analysis, seven sites were not accessible and one was a duplicate. Therefore, only 92 of the original 100 sites (92%) were included for review in our current study. The eight inaccessible sites were checked a second time on April 8, 2017, to confirm their exclusion from the study.

As shown in Table 1, of the 92 sites reviewed, 11 (11.9%) had an editorial process mentioned on the website and 10 (10.9%) of the 11 also included a description of their editorial process. The majority of sites (88.0%) did not mention or describe an editorial process. However, eight of these 81 sites mentioned an editorial board and were contacted for clarification. Only three of these eight sites replied with a description of their editorial process. One attempt was made to contact all other included sites to clarify and elaborate on their editorial process. However, 29 sites had no e-mail or contact form available, and only 55 sites were successfully contacted (27 by e-mail and 28 by online contact form), with only four of 55 sites replying. Out of the seven total sites that elaborated upon their degree of editorial supervision, 29% (2/7) identified themselves as single-author operations without a formal editorial process, and 71% described a formal editorial process that was not publicly detailed on their website (5/7).

In total, all sites ($n = 15$) that described an editorial process either on their site ($n = 10$) or by subsequent

Table 1
Number of Online Educational Resources That Mention and Describe Their Editorial Process

	Number of Sites
Editorial process mentioned on site	11
Editorial process mentioned and described	10
Editorial process mentioned only	1
Editorial process not mentioned on site	81
No editorial board listed	73
Editorial board listed	8

contact ($n = 5$) used a form of prepublication peer review. Site editors were responsible for prepublication peer reviews for all sites; however, four sites (St. Emlyn's, EMDocs, Taming the SRU, and ALiEM) also solicited prepublication peer reviews from experts in the field. Five sites (ALiEM, EMCrit, CanadiEM, St. Emlyn's, and Don't Forget the Bubbles) also explicitly stated that their editorial process included postpublication peer review. There was high inter-rater agreement for identifying whether editorial process was mentioned on a site, with a Cohen's kappa (κ) of 0.90. Inter-rater agreement for description of editorial process was also excellent, with a Cohen's kappa (κ) of 1.00.

A total of 19.6% of the sites reviewed had at least one affiliation with an academic institution. Affiliations were primarily with academic institutions and EM departments and institutes. Twenty-one sites (22.8%) had at least one nonacademic affiliation. For many sites, this was an affiliation with another FOAM site or with the Social Media and Critical Care (SMACC) conference. Three sites were affiliated with EM publications (ALiEM with the *Western Journal of Emergency Medicine*; EM Basic with *EB Medicine*; EM for Physicians with *EM News*) and four sites listed industry sponsors.

Social Media index ranking of sites that reported editorial process can be seen in Table 2. The Mann-Whitney U-test found that SMi rankings were similarly distributed between groups of sites with and without a reported editorial process ($p = 0.31$).

An OR was calculated to determine whether sites with at least one academic affiliation were more likely to describe their editorial process. The calculated OR of 5.31 showed a statistically significant relationship between presence of at least one academic affiliation and disclosure of editorial process on the site page (95% CI = 1.34–21.0). A greater proportion of sites with academic affiliations disclosed their editorial

Table 2
Number of Online Educational Resources With Academic and Nonacademic Affiliations

Sites with Mention of Editorial Process	SMi Ranking (Out of 100)
EmCrit	2
ALiEM	3
REBEL EM	8
CanadiEM	11
Taming the SRU	28
PHARM blog	38
Don't forget the bubbles	51
RCEM FOAM Network	72
SinaiEM Media Site	73
EM Tutorials	82
EM PharmD	97

SMi = social media index.

Table 3
Relationship Between Academic Affiliations and Editorial Process Description

	Editorial Process Described		
	Yes	No	Total
Academic affiliation	5	13	18
No academic affiliation	5	69	74
Total	10	82	92

process (5/18) compared to sites without academic affiliations (5/74). The Fisher's exact test also confirmed there was a significant difference between the two groups ($p < 0.05$). See Table 3 for the values.

DISCUSSION

Our study examined the disclosure and description of editorial processes in EM and critical care online resources. As shown in Table 1, disclosure of editorial process is actually quite rare, with only 11% of sites publicly describing their editorial process. This lack of transparency presents a challenge for learners who may lack the knowledge and skills to identify inaccurate content and may place undeserved trust in online resources that have been subject to no expert oversight.^{4,24} Lack of disclosure may also hinder the use of editorial process as a quality indicator for OERs.

While the lack of transparency in editorial process is a concern, our findings do not mean that editorial regulation is absent for most OERs. Several sites that did not publicly post their editorial process responded

to inquiries with descriptions of fairly rigorous editorial processes that incorporated both expert prepublication peer review and crowd-sourced postpublication peer review. Some sites ($n = 8$) also listed an editorial board, which indicates a degree of editorial oversight for the site's content.

Although the low response rate (seven of 92) limits generalizability, these results suggest that some sites may have a defined editorial process, but do not post it for readers to review.²⁵ However, previous research into quality indicators suggests that poor responsiveness of site owners and editors may be a marker of lower quality among OERs.²² A significant number of sites (29 of 92) did not list any available method of contact, which also highlights the challenges involved in seeking clarification about editorial process.

No similar studies evaluating editorial process in online medical education resources were found, preventing any estimation of the prevalence of formal editorial processes among sites that did not disclose a process or respond to contact. The low response rate admittedly does preclude generalizability of the data, but pragmatically we have chosen to essentially assume the worst-case scenario—i.e., that no listing on the website plus a lack of response connotes a lack of an editorial process. This poor response rate may reflect the challenges that accompany the inconsistent disclosure of editorial process in OERs, as readers may similarly struggle to gain clarification on editorial processes for many sites.

A form of peer review also exists for all open access sites through discussion, comments, and feedback after publication, often referred to as “postpublication peer review.” Postpublication peer review can be rapid, allows input from experts in the field, and fits well with the interactive and engaged nature of the FOAM community.^{8,25} Although only five sites explicitly identified use of postpublication peer review as part of their editorial process, almost all blogs and podcasts have open avenues for public feedback, either through a blog comments section or through social media (e.g., Facebook and Twitter). The advantages of postpublication peer review have been recognized outside of the FOAM community, and some journals have begun to integrate postpublication peer review into their editorial process through models like the PubMed Commons.²⁶ Advocates of postpublication peer review argue that it rivals or even exceeds prepublication peer review in accuracy and can overcome many of the limitations of the traditional peer review model.^{1,25,27} The

“critical clinician” has been recently described as a new type of scholar in the digital era may also play a crucial role in sparking discussion about the quality of online content and in driving rigorous postpublication peer review through skilled critical appraisal.⁹ Even sites without a formal editorial process may, therefore, still be subject to a crowd-sourced version of editorial oversight from the online FOAM community. While postpublication peer review allows continuous feedback and review from experts in the field, one concern is that sites with lower readership may be at a disadvantage. Crowd-sourcing peer review requires an active, motivated, and engaged body of content users.² Sites without a substantive enough viewership will receive less scrutiny and critical comments and be subject to less discussion about each post.²⁹ Solicitation of expert postpublication peer reviews is one method of moving beyond reliance on crowd-sourcing reader comments while also ensuring review by qualified individuals.¹⁷ Less prominent sites have less reach and influence due to a smaller viewership, which in turn may perpetuate the danger of dissemination of inaccurate content.

The shift toward considering blogs and podcasts as scholarly products is fairly recent, and innovations in editorial process for blogs and podcasts are ongoing.¹ There is a fine balance between ensuring adequate editorial oversight and maintaining the unique benefits of open OERs.⁶ Requiring extensive peer review with multiple revisions before publication to deem a resource trustworthy or scholarly could limit the ability of FOAM resources to reduce the evidence-to-practice gap by slowing the appraisal and dissemination of new research evidence.⁶ Leaders in the field have begun to adapt traditional editorial processes to meet the unique demands of online resources.^{16,28} For example, the Academic Life in Emergency Medicine (ALiEM) blog developed a novel rigorous and transparent open expert pre- and postpublication peer review process.¹⁶ The ALiEM process merges aspects of traditional academic publishing like expert prepublication peer review and a formal process for prepublication feedback and revisions with newer strategies like crowd-sourcing comments and expert postpublication review and revision.¹⁶

It is also important to consider that not all blogs and podcasts are produced for the same purpose. While some larger sites like ALiEM and CanadiEM emphasize the creation and dissemination of up-to-date content based on primary evidence and have the

resources for editorial teams and expert peer review, many blogs and podcasts within the FOAM community are single-author operations and are intended to represent the personal opinion of the writers.⁶ Although these smaller sites may choose to forgo prepublication peer review, they still play an important role within the FOAM community and should not be dismissed based on a lack of a rigorous editorial process. Clinical vignettes and tacit knowledge from experienced clinician writers can complement an evidence-based medicine approach and these sites are still subject to oversight through postpublication peer review.^{6,30,31}

The results suggest that a greater proportion of sites affiliated with an academic institution disclosed their editorial process. It is difficult to ascertain whether sites with institutional affiliations were more likely to develop and employ defined editorial processes or whether this correlation is due to a greater emphasis on transparency. The majority of sites with academic affiliations were larger multiauthor blogs with connections to EM faculties and could therefore have greater access to prepublication review by experts in the field. It is also possible that sites affiliated with academic institutions may specifically intend for their content to serve as scholarly resources and may disclose their editorial process to enhance credibility. While connections to academic institutions may increase the likelihood of having and disclosing an editorial process, room for improvement remains, as 13 of 18 sites affiliated with academic institutions did not disclose their editorial process. There was no relationship found between sites that reported their editorial process and ranking on the SMi; therefore, disclosure of the editorial process does not currently appear to influence or be influenced by site popularity.

Overall, our findings suggest that although transparency about the editorial process is lacking, formal editorial processes do exist and are employed by many OER sites to ensure the quality of their content, especially by larger multiauthor blogs. Previous research into quality indicators for OERs highlighted the importance of disclosure of editorial process in allowing an accurate assessment of credibility.^{24–26} In a previous study, over half of the medical educators surveyed agreed on the importance of presence of editorial process as a quality indicator (69% for blogs and 53% for podcasts), and another survey determined that 60% of EM residents and 90% of program directors identified the presence of a formal prepublication peer review

process as important when selecting OERs.^{24–26} These findings suggest that consumers of OERs value mention and description of editorial process and support its role as an important quality indicator. Improving disclosure of robust editorial processes could help legitimize blogs and podcasts as educational resources, reassure readers about the quality of online material, and enhance their quality and scholarly credibility.¹⁶ Sites that are intended to be personal or expert opinion and lack a formal editorial process would also benefit from improved transparency about the process and intent behind the content. Conflict of interest and legal disclaimers are almost ubiquitous for blogs and podcasts, and one recommendation from this study is that the inclusion of disclaimers about editorial process should also be considered necessary. Clear and accessible disclosure of the editorial process is part of a reader-centered approach and would help learners and clinicians make informed decisions about how to interpret and apply content. Clarity about the processes behind the creation of online educational content is a recurring theme in studies of quality indicators, and improved transparency could help support learners during this transitional period in medical education where education and skills about the appraisal of secondary literature like OERs lags behind the prevalence of their use.

LIMITATIONS

Only two reviewers evaluated the sites for the mention and description of editorial process. While Cohen's kappa is an appropriate tool for assessing inter-rater reliability for two raters, a larger pool of raters could have improved the generalizability of the study findings. Three sites that did not disclose their editorial process had some content hidden by a paywall. It is possible that an editorial process was mentioned or described in an area that required a paid subscription to access. However, if this were the case, users of the free content would also be restricted from viewing any description of the editorial process.

Another limitation of the study was the poor response rate to requests for additional information about editorial process. Less than 10% of sites (seven of 92) responded to multiple requests by the authorship team to elaborate or clarify their editorial process or the role of their editorial board. Of the seven sites that responded, five sites had a robust editorial process, suggesting that formal editorial processes could

be more prevalent among OERs than described in our study. The primary objective of this study was whether editorial processes were disclosed and described publicly on the website, which was not impacted by the low response rate.

While more sites with academic affiliations had an editorial process, a low level of precision hinders interpretation of the relationship. This is likely a function of sample size and could be expected to improve with a larger sample of OERs.

Finally, the community of OER producers is fairly small, and the creators of several sites are also involved in the creation of critical appraisal tools and the study of quality metrics. These authors may therefore be more likely to establish a formal editorial process and value disclosure.

Future Direction

The high degree of inter-rater reliability for identifying the presence ($\kappa = 0.90$) and description ($\kappa = 1.00$) of editorial process supports the feasibility of using presence of an editorial process as an item in critical appraisal tools like the METRIQ score.²⁴ The METRIQ tool uses 7-point Likert scales to score quality indicators, including whether an editorial process is present and whether it is outlined. In the METRIQ study, trainees demonstrated a high percentage (>25%) of uncertainty using a Likert scales to evaluate editorial process.²⁴ The excellent inter-rater reliability in this study with the use of a yes/no question raises the question of whether replacing the Likert scale with a simple binary score would improve the utility of editorial process as a quality indicator.

This study is the first to evaluate the landscape of editorial process in OERs and has identified a need for improved transparency in editorial process. However, while it seems intuitive that a transparent and robust editorial process would lead to higher-quality resources and be met with increased trust by readers, there are no data evaluating the outcomes of robust pre- or postpublication peer review processes in online resources. Exploring the correlation between the type of editorial process and other markers like SMi ranking, reader surveys or recommendations for use by educators could help elucidate the role that editorial process plays in how users engage with online resources.^{16,28}

There are no data about the role of academic and nonacademic affiliations as quality indicators for OERs. It is plausible that academic affiliation itself

could increase credibility of the source; however, our study findings show that only a minority of OERs have formal academic affiliations.

CONCLUSION

In conclusion, editorial processes are not routinely disclosed or well described in online medical education resources. This may impede readers' ability to assess quality and credibility. However, the results of this study suggest that some sites may have editorial processes consisting of pre- and/or postpublication peer review but do not disclose them. Inter-rater reliability for identifying disclosure and description of editorial process is excellent, which supports the use of editorial process as a reliable marker of quality within a critical appraisal tool.

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