



Original research

A picture tells a thousand words: A content analysis of concussion-related images online

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ARTICLE INFO

Article history:

Received 17 August 2015

Received in revised form

21 February 2016

Accepted 1 March 2016

Keywords:

Concussion

Social media

Knowledge translation

Public health

ABSTRACT

Background and aim: Recently image-sharing social media platforms have become a popular medium for sharing health-related images and associated information. However within the field of sports medicine, and more specifically sports related concussion, the content of images and meta-data shared through these popular platforms have not been investigated. The aim of this study was to analyse the content of concussion-related images and its accompanying meta-data on image-sharing social media platforms.

Methods: We retrieved 300 images from Pinterest, Instagram and Flickr by using a standardised search strategy. All images were screened and duplicate images were removed. We excluded images if they were: non-static images; illustrations; animations; or screenshots. The content and characteristics of each image was evaluated using a customised coding scheme to determine major content themes, and images were referenced to the current international concussion management guidelines.

Results: From 300 potentially relevant images, 176 images were included for analysis; 70 from Pinterest, 63 from Flickr, and 43 from Instagram. Most images were of another person or a scene (64%), with the primary content depicting injured individuals (39%). The primary purposes of the images were to share a concussion-related incident (33%) and to dispense education (19%). For those images where it could be evaluated, the majority (91%) were found to reflect the Sports Concussion Assessment Tool 3 (SCAT3) guidelines.

Conclusions: The ability to rapidly disseminate rich information through photos, images, and infographics to a wide-reaching audience suggests that image-sharing social media platforms could be used as an effective communication tool for sports concussion. Public health strategies could direct educative content to targeted populations via the use of image-sharing platforms. Further research is required to understand how image-sharing platforms can be used to effectively relay evidence-based information to patients and sports medicine clinicians.

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1. Introduction

Information sharing and knowledge dissemination is an integral aspect of the management and prevention of many sporting injuries. In the field of sports concussion the importance of accurate,

evidence-based knowledge dissemination was first highlighted at the 2008 International Conference on Concussion in Sport (McCrorry et al., 2008; Provvidenza & Johnston, 2009). These discussions have further developed and feature in the current consensus statement (McCrorry et al., 2012), and from a medical and epidemiological stand-point sports concussion is a serious public health problem (Wiebe, Comstock, & Nance, 2011). Recently there has been considerable focus and attention on sports concussion in the mainstream media, both at community (The Irish News, 2014) and elite (The New York Times, 2014) athletic levels. In parallel, extensive research has shown that social media platforms such as

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Facebook (Ahmed et al., 2010), Twitter (Sullivan et al., 2012), and YouTube (Williams et al., 2014) are being used by patients and healthcare professionals to share concussion-related information. The functionality of these social media technologies allied to the popularity of social media means that the general public's exchange of concussion information has never been greater.

Popularity and usage of social media technologies evolve rapidly. In recent years, there has been a significant shift from basic messaging platforms (e.g. Twitter) to more sophisticated image sharing platforms. According to the Pew Research Center's Internet project, 54% of internet users post original photos or videos to websites and 47% share photos or videos they found elsewhere online (The Pew Internet and American Life Project, 2013). In keeping with this, web and mobile platforms are being used to upload and share health-related images (O'Mara, 2012). Some of the fastest growing Social Networking Sites (SNSs) such as Pinterest, Flickr and Instagram are those that are dedicated to sharing images. Pinterest aims to connect people based on shared tastes and interests through images (Stellrecht, 2012) (called "pins"), and currently has 70 million registered users worldwide. Flickr is another popular image-sharing website created 10 years ago as an image-sharing community (Zeng & Wei, 2013) and currently has over 87 million users (Statistica Social Networks, 2014). More recently, Instagram has emerged as a major image-sharing social media platform. Since its recent inception in 2010, it has already accumulated 300 million users (Statistica Social Networks, 2014). Instagram enables users to take pictures and videos, apply digital filters to them, and share them instantly on its own platform and also via other major social networking sites (including on Facebook and Twitter).

Although these image-sharing sites are growing in usage, there has been little exploration of their use in healthcare. Two studies have examined the use of Flickr related to health; Renner et al. (2012) described the use of images on Flickr in relation to perceived HIV risk, whilst Yom-Tov and colleagues (2012) outlined the differences between pro-anorexia and pro-recovery images on Flickr. Both studies used Flickr to locate user uploaded images as sources of information together with the surrounding meta-data, and Yom-Tov et al. used a set of search terms to identify images that depicted an individual's orientation towards 'pro-anorexic' behaviour (Yom-Tov et al., 2012). Health-related research conducted on Pinterest is minimal at present, with Shellenbarger and Robb (2013) providing a discussion of the use of Pinterest in enhancing active and engaged learning strategies for nursing education. Although these studies provide preliminary insight into the content of health-related information on image-sharing platforms, to the best of our knowledge there has been no studies conducted to analyse health-related images in the discipline of sports medicine.

At present it is not known what type of concussion-related information is being disseminated through image-sharing platforms and whether their content reflects best-practice concussion guidelines. Undertaking content analyses of online images related to sports-related concussion will provide an understanding of the type and quality of information that is disseminated through these emerging SNSs. The purpose of this study was to systematically identify and analyse concussion-related images shared on popular image-sharing sites with reference to the current international concussion guidelines.

2. Methods

We used a systematic review process informed by existing methodologies from previous studies that evaluated image-sharing websites (Renner et al., 2012; Yom-Tov et al., 2012). The multi-stage data extraction process and analysis are shown in Fig. 1. As this

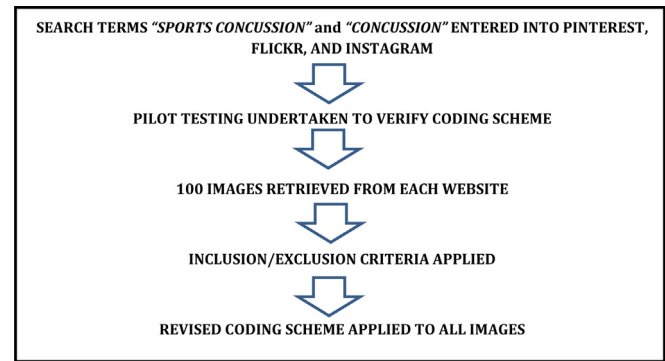


Fig. 1. Pathway involved in data extraction and analysis.

study did not involve direct contact with human participants, ethical approval was not sought. All of the data for this study was from freely available content on the internet.

2.1. Sources of data

The top three image-sharing platforms were selected based on their popularity (ranked by their total number of worldwide users), and these were Pinterest, Flickr and Instagram. For consistency and rigor, all searches were conducted on web-based versions of each of these websites (i.e. www.pinterest.com/, www.flickr.com/ and <http://web.stagram.com/>) using the web browser Google Chrome.

2.1.1. Search strategy

For each of the three platforms (Pinterest, Flickr, and Instagram), the following search terms were used: "sports concussion" and "concussion". The first 50 images from each platform were retrieved for analysis. All images were retrieved in the same 24-h window which ran from 10am GMT 12th August 2013 to 10am GMT 13th August 2013.

After retrieving all images, we removed duplicate images and applied the predefined inclusion/exclusion criteria. Images were excluded if they were: irrelevant photos/associated text (not related to sports related concussion, for example the music band "Concussion"); videos (i.e. non-images); illustrations, artistic/computer-generated animation; screenshots/screencasts. When there were duplicate images, the first version of the image posted chronologically was included.

2.1.2. Pilot testing and development of the data coding scheme

A sample of 15 images was assessed prior to data collection/analysis in order to develop and refine the coding scheme. Five images that were not retrieved from the 'main search' were taken from each of the three sites and each member of the research team (OHA/LLS/HL) reviewed these images independently. By using a pre-developed coding scheme, the results of the pilot test were used to discuss how final coding decisions for each of the images was reached. Subsequently, minor alterations were made to the coding scheme before the main analysis. The outline and descriptions of the developed coding scheme are outlined in Table 1.

2.1.3. Content analysis

We used content analysis to evaluate the included images (Downe-Wamboldt, 1992), and this methodology has been used in similar studies that evaluated online concussion information (Ahmed et al., 2010; Sullivan et al., 2012). The categories in Table 1 were derived through an iterative process of discussion between the investigators to generate elements which would represent the

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