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Cluster anxiety-related adverse events following immunization (AEFI): An assessment of reports detected in social media and those identified using an online search engine

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ABSTRACT

Background: Adverse events following immunization (AEFI) arising from anxiety have rarely been reported as a cluster(s) in the setting of a mass vaccination program. Reports of clusters of anxiety-related AEFIs are understudied. Social media and the web may be a resource for public health investigators.

Methods: We searched Google and Facebook separately from Atlanta and Geneva to identify reports of cluster anxiety-related AEFIs. We reviewed a sample of reports summarizing year, country/setting, vaccine involved, patient symptoms, clinical management, and impact to vaccination programs.

Results: We found 39 reports referring to 18 unique cluster events. Some reports were only found based on the geographic location from where the search was performed. The most common vaccine implicated in reports was human papillomavirus (HPV) vaccine (48.7%). The majority of reports (97.4%) involved children and vaccination programs in school settings or as part of national vaccination campaigns. Five vaccination programs were reportedly halted because of these cluster events. In this study, we identified 18 cluster events that were not published in traditional scientific peer-reviewed literature.

Conclusions: Social media and online search engines are useful resources for identifying reports of cluster anxiety-related AEFIs and the geographic location of the researcher is an important factor to consider when conducting these studies. Solely relying upon traditional peer-reviewed journals may seriously underestimate the occurrence of such cluster events.

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1. Introduction

Immunization anxiety-related reaction refers to an adverse event following immunization (AEFI) that arises from anxiety about the immunization [1]. Clusters of anxiety-related AEFIs have rarely been reported in traditional peer-reviewed journals and since 1992 there have been 8 published reports of AEFIs occurring in clusters or group settings [2]. These episodes may have serious consequences for both individual vaccinees and negatively impact vaccination programs. In certain instances, vaccinees have been

misdiagnosed with anaphylaxis and/or other serious events resulting in hospitalization and/or medical interventions [3]. When these incidents occur in group settings, concerns about the safety of the vaccine may spread rapidly among vaccinated individuals and the broader community via print, television media, and word of mouth, which may serve to disrupt and possibly halt the vaccination program [4]. Reasons for why these events are not reported in the literature include a potential publication bias favoring reports in which the situation resolved and the vaccination program resumed [2]. There is also a need for evidence-based guidelines on how to prevent or address anxiety-related AEFI clusters occurring with vaccine introductions. Additional reports not previously found in the peer-reviewed literature can help to supplement the understanding and characterization of these disruptive events.

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Social media and the web are becoming increasingly popular ways of sharing personal health-related information. Data sourced from these online networks may complement traditional information systems and assist public health monitoring and surveillance efforts. Although under-reporting may be expected to significantly impact the usefulness of such surveillance, in one published report, researchers found thousands of drug-related posts, potentially revealing serious and unknown Adverse Drug Reactions (ADRs) through data mining social media sites [5]. These methods represent new ways of conducting pharmacovigilance, and serve as an indication of how online surveillance systems can augment current systems [5]. The relatively small number of cluster AEFIs reported in the medical literature [2] leads us to suspect that the occurrence of these events are underestimated.

Millions of people use internet platforms to research and discuss vaccines, vaccine sentiments, and general public health issues [6,7]. There have been several studies looking at the role of online networks in identifying public attitudes toward vaccine safety [8–10]. These online networks may represent a novel resource for identifying potential clusters of anxiety-related AEFIs and provide insight into how health issues are being communicated and shared over the Internet. We reviewed the Google and Facebook datasets due to their size and popularity among users. Google processes 100 billion searches per month [11] and Facebook connects over 1.5 billion people in over 80 different countries [12]. Forty-four percent of online users get news through Facebook and use the online network to discuss and disseminate information [13]. As a search engine, Google is able to index a variety of online report types (e.g., news websites, blogs, and academic websites)

and this diversity in information is one of the strengths of this dataset and why it was chosen. Comparatively, Facebook offers a more exclusive online community (i.e., only members of Facebook can post, reply, and share information) and offers more insight into the personal opinions of individual users and how they interact with each other and share information. Facebook does not limit the amount of information that can be contained in a post, unlike other social media platforms like Twitter that limits the user's characters. We felt that more in depth information could be captured through Facebook as compared to other types of social media. However, there is potential in future investigation of all types of social media as each have their own strengths and insight into different online communities.

The primary objective of this exploratory study was to assess the possibility of detecting clusters of anxiety-related AEFIs, not otherwise reported in traditional peer-reviewed systems. The secondary objective was to explore the way clusters were being described online and shared by users.

2. Methods

2.1. Data

Two reviewers (one in Atlanta and the other in Geneva) independently searched Google and Facebook to identify reports (i.e., websites, blogs, etc.) of AEFI clusters (≥ 2 persons, following mass vaccination and concentrated in a geographic location or related to a primary cluster immunization event) (Fig. 1). Results were classified as those found in common (i.e., both reviewers identified

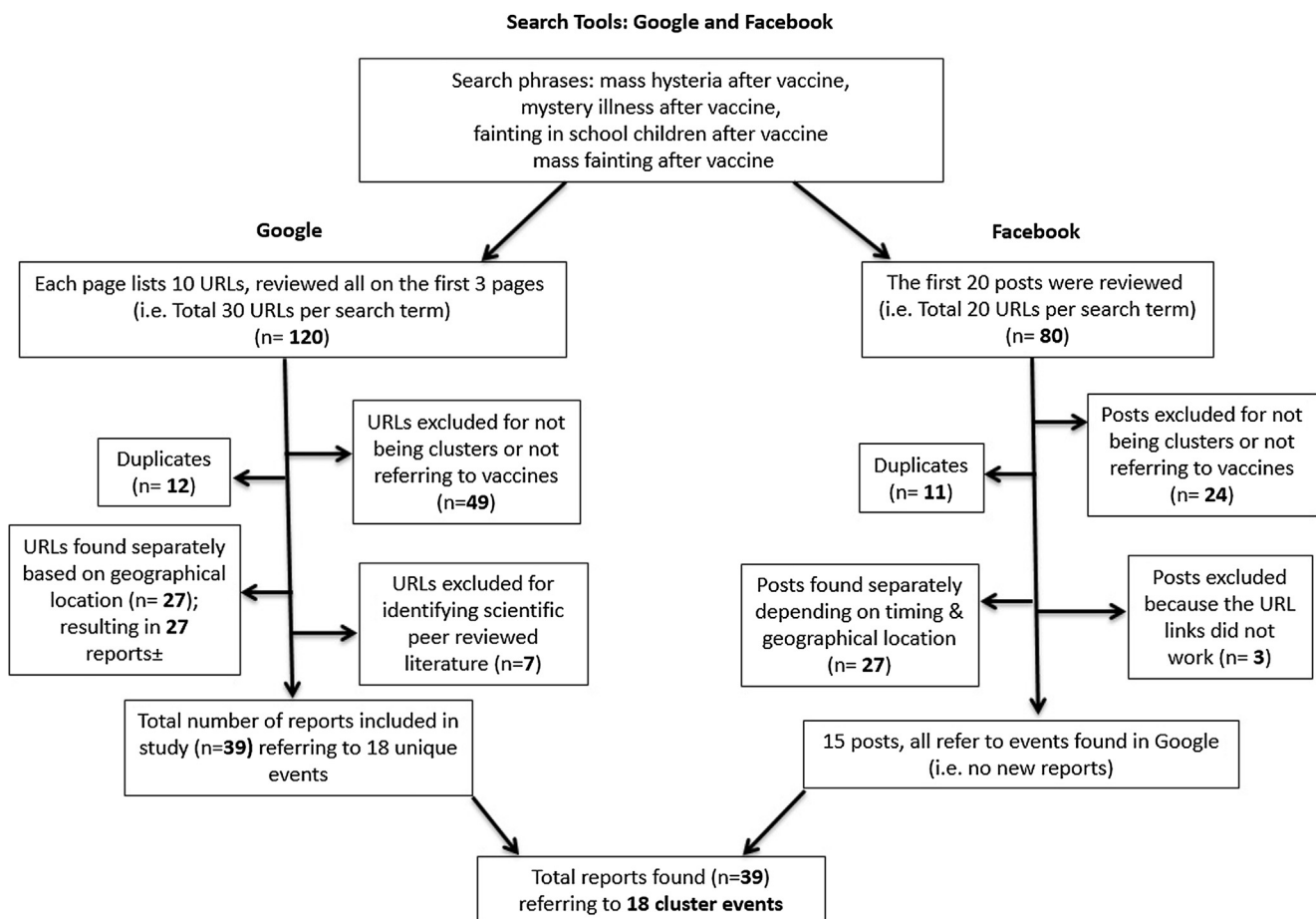


Fig. 1. Flow diagram of search tools. ±26 of the 27 reports referred to events already found in common by reviewers, therefore only 1 report (referring to 1 unique event) was included in the final Google results.

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