THE USEFULNESS OF LISTENING SOCIAL MEDIA FOR PHARMACOVIGILANCE PURPOSES

Irma Convertino[1], Sara Ferraro[1], Luca Leonardi[1], Corrado Blandizzi[2], Marco Tuccori[2]

[1]Unit of Pharmacology and Pharmacovigilance, Department of Clinical and Experimental Medicine, University of Pisa, Pisa - Italy, [2]Unit of Pharmacology and Pharmacovigilance, Department of Clinical and Experimental Medicine, University of Pisa; Unit of Adverse Drug Reactions Monitoring, University Hospital of Pisa, Pisa - Italy

Introduction: In the last years, the large diffusion of social media leads to their data mining not only for commercial and political purposes but also for pharmacovigilance (PV) ones. Data mining of social media is a complex process, made up of three broad categories: listening (safety data reporting), engaging (follow-up), and broadcasting (risk communication). The usefulness of listening social media for PV purposes and the quality of the related proto-signals remain questionable. This systematic review is aimed at summarizing evidences on the effectiveness of social media data mining strategies, assessing the quality of retrieved information and evaluating their forecasting power compared to the safety warnings issued by Health Authorities.

Methods: We performed a systematic review in accordance with PRISMA and MOOSE statements. We selected English studies published up to December 31st, 2017in MEDLINE, EMBASE, and Google Scholar. We included studies investigating the frequency of proto-adverse drug events (ADEs) and/or proto-signals in social media, and reporting at least one identifiable social media (i.e. by name or URL) as data source. We excluded: review articles, prospective studies, sentiment analysis, text mining analysis, and studies using search engines only and focusing on proto-ADEs following immunization. We assessed the quality of information by evaluating seriousness, notoriety and causality assessment of proto-ADEs. We evaluated the methodological approaches used for assessing proto-ADEs and proto-signals, and the related forecasting power compared with the Health Authority warnings.

Results: A total of 6,627articles were selected. Based on inclusion criteria, we included 38studies. Out of these, 9studies provided information about the age of users, 8reported information about the geographical areas to which users belong, 16provided information about notoriety, 18used a single social media as data source. The methodological approaches used in the included studies can be classified into three sequential steps: 1) selection of posts, 2) identification of proto-ADEs, 3) identification of proto-signals. The first step included a drug-based approach (37studies), or an event-based approach (1study). The second step included studies performed on non-medical social media (n. = 11), on medical social media (n. = 26), and on mixed data sources (n. = 1). Out of the studies performed on non-medical social media, 8investigated specific drug classes (e.g. antiretroviral, antidiabetic, anti-rheumatic, antipsychotics, antidepressants, glucocorticoids) and 3focused on drugs or drug classes most frequently mentioned in the posts. Out of the studies performed on medical social media, 19were on general medical contents, 2on specific disease and 5on both of them. Serious and unexpected proto-ADEs were detected in 21and 15studies, respectively. The third step included the signal detection on social media performed by a descriptive analysis or a disproportional analysis (i.e. ROR, PRR) or a semantic association (i.e. lift, leverage). Only 8studies assessed whether social media were able to anticipate traditional signal detection systems and only 6studies showed that proto-signals identified by social media listening had the potential of anticipating Health Authority warnings.

Conclusion and discussion: Listening social media has the potential of identifying serious and unexpected ADEs and of forecasting signals compared to traditional pharmacovigilance systems. However, the poor quality of information characterizing social media allows rarely the causality assessment as compared with spontaneous reporting databases. The personal perception of patients reported in social media could be useful for risk communication strategies. However, signal detection in social media cannot be currently recommended for routine pharmacovigilance, due to logistic and technical issues.