Nurses facing health misinformation: How to spot scientific articles misuse?

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Abstract: Currently, large amounts of health information, mainly in the social media field, have led to an infodemic which, together with the vast misleading and inaccurate information that can be accessed, represents a substantial public health issue. Healthcare professionals can help to identify and even prevent the dissemination of such information, as well as to lead the struggle against it by denying it. Therefore, the aim of this paper is to propose a guide to be used for the detection of health misinformation focused on health professionals. The model is based on an in-depth analysis, focused on assessing the contextualization of the type of scientific document, the possibility of extrapolation of the information, the causality, as well as the quality of the scientific evidence given. Besides requesting an effort from healthcare professionals to prevent the spread of health disinformation, we believe it is essential to offer tools to easily detect it, whereby training in research methodology is the main tool for healthcare professionals in the fight against misinformation and its negative implications on people's health

Keywords: Fake news; misinformation; nurses; social media; Public Health

Introduction

The COVID-19 pandemic, declared on March 11, 2020 [1], has had a major impact worldwide, not only in the number of individuals affected or people dying because of the disease [2] but also at the economic level with severe and detrimental effects [3].

During health emergencies, such as the one resulting from the COVID19 pandemic, the need for information becomes a daily concern for many people [4], and the lack of information is found to generate negative emotions such as stress, anxiety, uncertainty, phobia, or frustration [5,6].

Demand for information together with the large amount of information generated, which has led to an infodemia considered a major health problem [7] globally, are associated with the emergence of uncertainty about what is or is not verified health information [8], causing

a decrease in adherence to the recommendations of health authorities [6] but also making people being less critical of the information consulted and therefore more prone to believe in biased information[9].

Dissemination of this infodemia is mainly through the so-called social media, where we can distinguish: i) social networks, such as Facebook, Twitter, Instagram or TikTok, to name just a few [8,10], but also ii) instant messaging applications, such as WhatsApp, Telegram, etc. [10]. The easy and rapid access to these platforms and the lack of control over the truthfulness of the content generated, mean that they can be considered as a quick channel for the spread of unverified health information [11], representing a potential threat to public health [12], and even modifying health care habits in accordance with the information accessed through these media [8,11]. It is important to define that the unverified health information exposure is causing significant concerns such as the generation of misinformation about treatments or healthy habits [13]. The announcement through the media and social networks that hydroxychloroquine and chloroquine would be game-changing
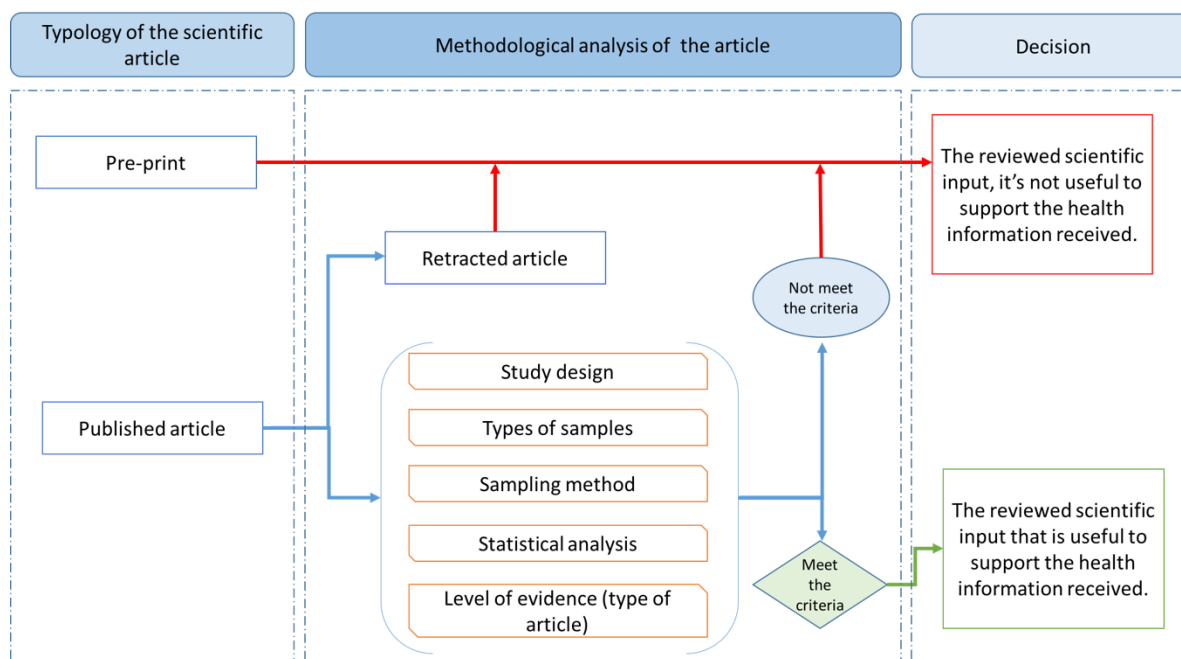
Figure 1. Decision algorithm on suitability of scientific literature

agents for COVID-19 and would become a potential curative for the disease, without any solid scientific evidence, provides an example thereof. Similar situations occurred with the consumption of methanol, cocaine, as well as the consumption of vitamin D, C, or even hot baths [13].

Furthermore, in social networks, there are a vast number of conspiracy theories and rumors that can affect the management of the pandemic [14]. It is through social media, where there has been increased exposure to information related to fake drugs, fake news and misinformation about drugs and treatments around COVID-19, having found that much of it is associated with scientific articles that were misinterpreted by the generators of the messages, causing confusion in readers [15]. Therefore, this situation significantly impairs correct public health communication and diminishes preventive measures [16,17].

In this setting, the nurse figure takes on special relevance, since the health information disseminated by these professionals is considered to be highly reliable [18]. Thus, the population attributes to nurses the role of health agents who interpret the messages related to health care [19] so that they are understandable and help to dismantle false information that impacts upon the care and self-care of the population [20,21]. Nevertheless, it is necessary to emphasize that health professionals themselves, both nurses and health science students, can be vulnerable to false information [22], and training in research methodology and communication of this collective is the best tool to differentiate between fake and verified information [20] and to avoid the dissemination of inaccurate information [23].

This essay aims to discuss the main elements that can be analyzed when nurses receive messages associated with health issues that use a scholarly article to support their claims, to differentiate whether the article is appropriate for the purposes for which it is used and whether it is truly valid to support the health information. We hope that these ideas can be used to help in the prompt recognition of incorrect health information and, thus, avoid the spread of news that will generate health misinformation among the population and even other health professionals.

Detection of validity of published scientific literature

Here we propose a series of elements that can help nurses in the validation and recognition of scientific articles and their contribution to health news so that they can really be used for that purpose and if they support the information provided. This review of the information can facilitate decision making for nurses, through a decision algorithm (Figure 1) based on the following elements: i) typology of the scientific article, and ii) methodological analysis of the article.

Typology of the scientific article attached to the health information: at this point the nurse may find that the article may be:

(i) "Pre-print": documents that have not been peer-reviewed by scientific peers, nor accepted for publication in a scientific journal. So its validity and scientific truthfulness is not assured [24]. This taxonomy appears in the most widely used scientific search engines, such as Pubmed, and can even be checked in some of the main preprint repositories such as Arxiv [24] (Figure 2).

(ii) Retracted article, a document that, due to certain problems regarding its veracity and/or scientific validity, has been retracted from the scientific literature [25]. Its identification can be observed in scientific search engines such as PubMed, appearing also in Google Scholar, and in a database that collects retracted articles like RetractionWatch [26] (Figure 2). There are also existing tools, such as SCRUTATIOm, which allow a fast, reproducible strategy for detecting retracted literature and

represent a useful tool in the process of critical review of already published scientific evidence [26].

(iii) A peer-reviewed article published in an accredited scientific journal, a document that meets the criteria of validity and control of scientific knowledge.

(ii) Causality: This point requires assessing two approaches:

a. The design of the research study itself, finding that from a study with an observational and descriptive design, cause and effect relationships have been inferred between the variables studied. This type of study may never yield such conclusions. The establishment of cause-effect relationships requires an experimental design (e.g., clinical trials).

b. The focus of the statistical analysis of the article. That is,
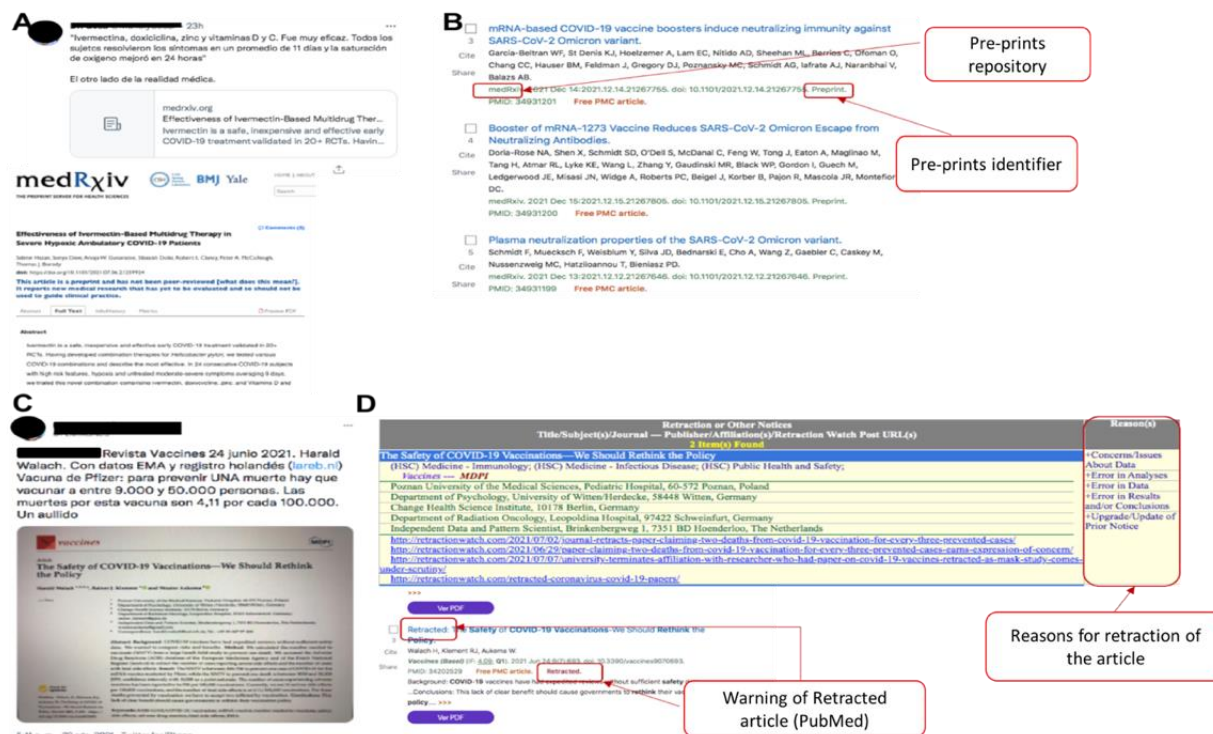
Figure 2. Where panel A represents a health information news obtained through the social network Twitter, and the result of clicking on the document provided in the tweet link. Panel B represents how a document can be recognized as a preprint using the PubMed search engine. Panel C represents a news item with health information obtained through the social network Twitter with the cover of a scientific article. Panel D shows the search for that article, in which the lower image shows how it appears in the PubMed search engine, showing how to identify a retracted article. The upper image shows the search result of that article in the RetractionWatch database, providing a summary of the reasons for its retraction.

In both the first and second type, the nurse must quickly recognize that these documents are not reliable to support the claims made in the received health information

Methodological analysis of the documents: this level of analysis will focus on the articles that have been previously assessed as valid by peer review, thus ensuring that the scientific method has validated their quality. This analysis will focus on several points:

(i) Extrapolation of information: specifically, two main points can be checked to assess whether the conclusions of scientific articles can be extrapolated to humans:

a. Type of sampling, since if it is "non-probabilistic" then it is inappropriate to make generalizations and assertions about the results, from the sample to the population [27].

b. If it has been developed in cellular models and/or experimental animals. In this type of studies, they cannot directly extrapolate their results to humans. This is one of the most frequently breached criteria and generates confusion among readers. An example of this situation is the fact that about 1% of drugs tested in animals/cell cultures eventually end up being suitable for therapeutic use in humans [28].

whether it is descriptive, relational, explanatory, predictive or applicative, since an association or correlation does not imply causation. Thus, in articles in which analyses have been performed in which possible associations are discussed, these should never be evaluated as hypothesis-testing analyses that establish relationships between cause and effect [28,29].

c. Quality of scientific evidence: the applicability and usefulness of scientific information is based on the level of evidence it provides. For example, the conclusions of a narrative review may never establish causality, (Table 1) nor can they be used to justify a treatment or clinical decision [29].

Table 1. Levels of evidence provided by the studies, which allow decisions to be made based on the fact that I indicate a higher level of evidence than III.

Level of scientific evidence		Type of studies
I	I-a	Systematic review and/or meta-analysis of randomized clinical trials.
	I-b	Randomized clinical trials.
II	II-a	Controlled clinical trials. Non randomized
	II-b	Cohort or case control studies (preferably multicenter).
	II-c	Comparative time series.
III		Expert opinions, descriptive studies, opinions based on clinical experiences.

Conclusions

This work has aimed to highlight a major problem of health disinformation, which reaches people and offers scientific documents that, a priori, support health claims and/or advice.

Given the apparent lack of scientific validity, this situation is very sensitive as it can lead to significant misunderstandings, making people believe that it is based on genuine and proven scientific evidence. This implies that it can be disseminated by health professionals themselves, considered as exponents of veracity due to their training, and that it can easily be mistaken with quality and verified scientific information because it has been improperly understood and assimilated. To avoid this situation, it is essential that nurses have the necessary skills and competences to recognize quality health information, avoiding health disinformation, being of special interest the development of research methodology skills and critical reading of scientific articles.

We believe that these simple guidelines, which comprise our proposed decision algorithm, can greatly facilitate the recognition by nurses of certain elements common to this type of information, and consolidate themselves as reference elements in the effort to combat the spread of misinformation in health care. Furthermore, we consider that this role of the nurse can lead to a reduction of uncertainty, fear and even disaffection towards treatments, drugs and care strategies for the population, due to the information intoxication generated by health infodemic. Nor can we ignore the repercussion in the social environment achieved by nurses as a reference for truthful health information.

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