Show me the study! Science by press release is not science

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BRIEF COMMUNICATION

Introduction

The Severe Acute Respiratory Syndrome caused by SARS-CoV-2 [1] resulted in a worldwide pandemic and also in a deluge of fast-tracked COVID-19-related scientific publications [2-5]. Accelerated time from submission to publication [6-8] and qualitative changes in the peer review processes [9] could imply lower quality of peer review in COVID-19 research. Evidence of lower quality of studies during the pandemic has indeed been found [2,10-12]. Meanwhile, data availability practices remained largely unchanged, making claims still very hard to be independently verified [13].

Due to the urgency for solutions that the COVID-19 crisis imposed, more efficiency in scientific publication should have been associated with better and more readily available reliable science [14-17]. Instead, studies carried in the pandemic era proved to be less reliable [2,10-12,18]. In addition, the trend to disseminate scientific findings through press releases and press conferences without immediate simultaneous access to the study has gained traction in 2020 and what was already far from ideal may have turned worse [18].

The appeal of press releases/conferences to journalists

Press releases are shortened communications from researchers or from a press office of an institution to journalists operating in newspapers, news hub/agencies and television/radio stations. They comprise a narrative contextualizing a given subject for reporting by the journalists. In order to accomplish that, they may present a brief description of a problem, context, methods, main findings and its implications to the scientific community and to a broader audience. They are also expected to set the debate agenda, giving the subject a specific framing. Although the press release format has been around since the beginning of the 20th century, only in the past twenty years it has become

a trend in scientific communication, being utilized usually by universities and scientific journals [19,20].

The adoption of press releases for science communication happens in conjunction with profound changes in the news media ecosystem brought about by the widespread commercial use of the Internet by the end of the 20th century. Media corporations have been cutting jobs in their newsrooms while having their ranks of specialized journalists substituted by generalist professionals who can cover a multitude of topics at the expense of depth [20,21]. That, in turn, resulted in an even greater demand for press releases, research spokespersons and scientific sources to help journalists translate scientific jargon into comprehensible coverage [21]. On the other hand, the trend may result also in releases being copied/pasted and published as received due to lack of time and specialization for rewriting in the newsrooms [20].

Thus, for the past twenty years, a demand for comprehensible scientific information has been growing steadily amongst the media [21], while at the same time being exploited by institutions and journals which find in press releases a tool for claiming expertise and obtaining attention to their scientific output, aiming to impress stakeholders such as fundings agencies and policymakers by means of media coverage [20]. In light of that, when the COVID-19 pandemic hit, the stage was set for science by press release/conference to become a trend in spite of their caveats.

The appeal of press releases/conferences to scientists

Our current understanding of the virus, the disease it causes and its pharmacological and non-pharmacological courses of prevention and management are, of course, due to reliable and well-disseminated science. To the best of our knowledge, there is no evidence to support that most fast-tracked studies from 2020 have been wasteful and aimed at self-promotion [2]. Notwithstanding, COVID-19 studies were found to be of worse quality than their prepandemic counterparts [10-13] and that is an indication that the reward system in science could have been currently skewed towards recognition at the expense of reliability [2]. On the topic of incentives and recognition, it is worthy mentioning that citation is not a reliable proxy for quality assessment. A citation means attention as it happens for many reasons other than recognition of the quality of the cited work [22-25]. Still, citation counting is widely used for the purpose of academic

recognition and career advancement [24,26] and, additionally, a study being featured on popular media is associated with acquiring more citations [27-29]. Thus, the expectation from authors regarding acquiring recognition and reputation through a broader media coverage [29] may have driven the practice of science by press release and press conference during the pandemic, with possible harmful results to public health [17,18,30].

Citations can agree or disagree with, and even misrepresent the cited content [24,25]. The more citations a paper receives, the more citations it tends to subsequently attract, a phenomenon dubbed the Matthew Effect [22,23]. Considering the current context of media business models, results announced with fanfare to the world via press releases and press conferences without the accompanying scientific paper readily available for scrutiny would try to: (a) give relevance for a given issue in the press coverage, (b) aim for framing its findings as its authors expect it to be covered by the press [19-20], (c) seek recognition by acquiring visibility and accumulating citation [29]. The first problem with this scenario is that scientific knowledge is supposed to be reliable because it must be independently scrutinized [31], building a broader body of evidence, much-needed in this crisis [14-17,30]. Therefore, science by press release and conference without the paper readily available is not only not scientific as it may just as well be adding noise to the debate, being thus a rather unscientific practice.

The appeal of spin and media frames to scientists and journalists – a recipe for misinformation

Even before the scientific information reaches the press, spin has been found to be already distorting the literature towards positive results [32]. Defined as reporting strategies, either intentional or not, that emphasize the beneficial effect of a given procedure or intervention [33-35], spin has been estimated to have a median prevalence of 67% in the biomedical literature in the pre-pandemic times [36]. It can hinder or distort the translation of research into clinical practice and, when reproduced by the media, can provide unrealistic expectations about new treatments and about the scientific enterprise, bringing serious consequences such as distrust and misguided choices at individual or populational level when studies with spin influence guidelines and policies [32].

Additionally, there is also spin stemming from media coverage. For example, news on the health section of Google News has been found to, in 78% of the cases, not

disclose a full reference or electronic link to the scientific article it was reporting. It has also been found at least one occurrence of spin in 114 news items (88% of the sample) and 18 different types of spin in the news in general. Spin has been found to manifest as misleading interpretation (59%), such as not reporting adverse events (25%), allegation of causal effect (49%) and misleading extrapolation (41%) [32]. Because of criteria of newsworthiness and how the business model of media currently operates, positive, extraordinary results tend to attract more media coverage [37,38] as they also feed into a certain widespread heroic narrative of science [39,40] in which Galileo-types discover hidden truths against all odds. Thus, studies with spin may have already been very alluring to journalists in pre-pandemic times. In the dramatic context of the pandemic, unfortunately, that kind of framing would also be expected to prosper.

In communication and media studies, the framing hypothesis studies a set of phenomena in which the media coverage reduces some elements of the perceived reality and arranges the remaining essential items into a coherent narrative that emphasizes connections between them in order to promote an interpretation anchored on plausibility [41-44]. Thus, it is a process that in itself tends to tone down nuance and simplify context, which are essential features to the accurate reporting of scientific findings to avoid, among other things, spin. Framing in news coverage generally encompasses four functions: (a) problem definition, (b) causal analysis, (c) moral judgment and (d) the promotion of solutions. The framing is also expected to cue, shape and change the interpretations of the readers and audience members, as well as their preferences, introducing or increasing the apparent importance of certain ideas, activating mental schemes that encourage the audience to think, feel and decide in a particular way [41-44]. However, studies on media framing have demonstrated it to not yield strong lasting results in the public as expected due to many other cognition processes related to self-perception, perception of others and expectation to belong to preferred groups and identities [45-54], as groups, their ideologies and identities, provide their own heuristics for perceiving and interpreting reality [55].

In other words, the media actively establishes the frames that it would expect the public to use to interpret and discuss public events. They organize the story, taking into account organizational and modality constraints, professional judgments and some judgments about the audience [41-44]. In contrast, people's information processing and their interpretation of facts and reality are also influenced by pre-existing structures,

schemes of interpretation that end up interacting and determining how the news will be perceived, accepted, rejected, doubted, which aspects will be cherry-picked and to what extent for the purpose of ego enhancement, affirming identity and ideology, and belonging to groups [41-55]. That said, spin on research findings, spin in media coverage and news coverage frames are a recipe for completely losing control over any scientific narrative, laying grounds for misinformation, disinformation and all in-between.

In light of that rationale, we would like to bring to attention some incidents from 2020 which spawned lasting consequences for Brazilian public health, from avoidable wasteful research to the acquisition by local governments of drugs to be deployed as treatment for COVID-19 regardless of evidence [14,17,30,56].

Hydroxychloroquine: questionable science communication

The attempt to repurpose an already known and readily accessible drug for the treatment of COVID-19 started early on in the pandemic with a piece published in preprint format [30] about hydroxychloroquine (HCQ), a drug already safely deployed in the treatment of a set of autoimmune diseases and malaria. A few days later, the preprint appeared as published paper, unchanged, in the *International Journal of Antimicrobial Agents* [57], a publication of the International Society of Chemotherapy. Correlation does not imply causation but, in the journal editorial board, three of the coauthors of the HCQ paper sit, one as editor-in-chief. Later on, the paper earned an expression of concern by the Society, yet not retraction followed [58]. Somehow, the paper ended up being discussed in cable television and HCQ started being promoted as treatment for COVID-19 by the Trump and the Bolsonaro administrations in the USA and in Brazil respectively, starting a worldwide trend in non-evidence-based treatments for COVID-19 [30,56].

In the same period, a Brazilian study reported positive effects of HCQ and azithromycin usage on suspected early-stage COVID-19 cases. The study was posted as a Dropbox file, then widely circulated through WhatsApp among physicians and journalists. A press release was also sent to journalists reporting the study findings and its authors conceded interviews to discuss them [59,60]. To the best of our knowledge, the study was never uploaded to any preprint server and never appeared in any journal. It presented major issues, deemed easy to spot during an actual in-depth peer review: (a) it was not randomized; (b) patients with flu-like symptoms were included without COVID-

19 testing for confirmation of what disease was being treated; (c) on average, the treatment group had more symptoms when compared to the control group; (d) reasons for hospitalizations and deaths were not disclosed; (e) the significance could not be as high as the authors claimed it to be, as the p-values (measure of significance) did not match the data disclosed; (f) ethical aspects were violated as patients were allocated and treated before approval by the ethical committee [60].

The HCQ narrative offered a quick, easy, already available solution to the sanitary crisis, a frame to a well-defined problem, with a specified etiologic agent identified and a solution discovered by ingenious rebellious scientists, a perfect fit into a very newsworthy [37,38] heroic narrative of science [39,40]. It offered problem definition, causal analysis, moral judgment (i.e., cheap drug, anti-Big Pharma, crisis solved!) and the promotion of solutions. Even after mainstream media picked up the pace and tried to disavow HCQ based on actual evidence, the story had already gained a life of its own, eclipsing evidence-based medicine and actual science [30,56].

Ivermectin: another go at antiparasitic drugs

The anti-parasitic drug ivermectin possible relation with COVID-19 appeared firstly in the literature in an in vitro study that reported efficacy of the drug in reducing the viral RNA in cell cultures. The study conclusion stated the inherent limitations of the in vitro model [61,62]. The drug was also investigated in a later retracted observational study that claimed lower hospital mortality when observing patients that received the drug. That study also displayed restraint in its conclusions, cautioning that conclusive findings would require controlled settings in randomized trials [63]. Results were independently replicated in another observational study, with similar statements about the unfeasibility of extrapolation of those findings due to lack of randomized trials on the topic [64]. In the meantime, Latin American governments embraced ivermectin as a potential treatment for COVID-19 without strong evidence of efficacy, stating in press conferences that the drug would be added to their guidelines of treatment and promoted it as COVID-19 preventive treatments. At the time, clinical trials in the region struggled to recruit participants because people were already taking the over-the-counter drug [62].

In September of 2020, a small trial in Argentina presented efficacy of the drug, however at the time, the results had not yet been replicated in other trials nor peer

reviewed [62]. In January 2021, a randomized clinical trial was published demonstrating that ivermectin had no effect on the proportion of patients with detectable SARS-CoV-2 RNA by PCR from nasopharyngeal swab at day 7 post-treatment regimen [65]. Also in January 2021, a press release by FLCCC Alliance (Front Line COVID-19 Critical Care Alliance) circulated via email and WhatsApp claiming that ivermectin was effective against the virus. Then, the manuscript written by the FLCCC had been accepted for publication in *Frontiers in Pharmacology*, being retracted later on in March 2021 before definitive publication [66].

Much like a poorly written sequel to a blockbuster, the ivermectin narrative appears to be a subsidiary of the rationale that gave the world the HCQ narrative: cheap, readily available solution to the biggest sanitary crisis of our time. If an antiparasitic drug could help (it cannot), perhaps another antiparasitic drug could help too. In its review guidelines, the National Institutes of Health (NIH) stated that there are insufficient data to recommend either for or against the use of ivermectin for the treatment of COVID-19. The limitations of the published clinical studies have been low sample sizes, poor reporting, lack of adequate control groups and poorly defined outcome measures [67].

Nitazoxanide: third is a charm (only it isn't)

Nitazoxanide, another antiparasitic drug, was tested both in vitro and in humans for efficacy against COVID-19 in Brazil [68]. The government went as far as conveying a press conference and emitting press releases to state that the drug was effective in reducing the viral load when taken within 3 days after the onset of symptoms. The caveat was that the dissemination of this claim took place even before the study was published for public scrutiny [69].

Four days after the press conference, the study appeared in the preprint platform medRxiv, showing a non-significant difference in its primary outcome, symptom resolution in patients with mild COVID-19, claiming that nitazoxanide was safe for use and that it had reduced viral load significantly. But viral load was a secondary outcome in the study [68]. This practice characterizes selective reporting, a type of spin in which only findings that are favorable to a given narrative are reported [32,33].

The nitazoxanide spin signals a strong pull towards forcing a poorly designed and poorly conducted study to fit into a hopeful narrative. Three different antiparasitic drugs underwent repurposing attempts to no avail and under no clear probable rationale other than being of low cost of production, readily available and antiparasitic. Maybe it could be a case of the association fallacy by way of the *argumentum ad populum*: when many people have been doing something, as it appears popular, many others will try and do it as well (regardless of adherence to facts or reason), much like the way the Mathew Effect functions for citations [22,23]. Cognition is, after all, by default, biased [45-55].

Conclusion

In the current context, any interaction between scientists and press is expected to summarize and contextualize the most important findings of an article for the general public, emphasizing the context and limitations of the research without modifications, promoting transparency, scientific integrity and literacy. For that to be accomplished, the paper should be made readily available in order for it to be criticized by independent sources not associated to that research before any public announcements take place in order to avoid chaotic waves of misinformation, disinformation and implementation of harmful, inefficient or wasteful public health policies.

Science is an endeavor prone to failure as it should be. It is hardly about discovery of hidden truths and mostly about lowering uncertainty about the natural world as to maybe extrapolate general laws from findings, thus generating theories and predicting nature whenever possible. The reward system in science may have been skewing that ethics towards discovery and publication of positive findings, a process very likely detached from the way nature works. Being so, it could be further separating scientific observation from real-world facts. The media business model may be prone to framing what has been already skewed by those tendencies into overly simplified narratives. As scientists must press for more nuance in the media coverage, they also must not give in to questionable research practices, questionable research report practices nor cause the inauguration of the field of research into questionable public science communication practices. The efforts to eradicate questionable research practices are already a lot of work as they are.

Science by press release and press conference is not aligned with the scientific ethos. If the purpose of science by press release/conference is indeed career advancement as speculated in the incidents narrated here, we strongly invite researchers to consider the following: what scientific career survives a scandal after questionable research publication and dissemination practices come to light as they eventually will in an ever transparent hyperconnected world? We cannot emphasize enough that these incidents and practices, although not a brand new phenomenon, cannot be tolerated as a new normal. They must not set a precedent but inform us of what not to do when communicating science now and after the current pandemic is over.

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