

# Scientific publication speed and retractions of **COVID-19 pandemic original articles**

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#### **ABSTRACT**

Objective. To describe the editorial processing time of published COVID-19 research articles and compare this with a similar topic, human influenza, and analyze the number of publications, withdrawals, and retractions.

Methods. A descriptive-analytical study using PubMed on research articles with the MeSH terms human influenza and COVID-19. Time to acceptance (from submission to acceptance) and time to publication (from acceptance to publication) were compared. Retractions and withdrawals were reviewed both qualitatively and quantitatively.

Results. There were 31 319 research articles on COVID-19 and 4 287 on human influenza published during 2020. The median time to acceptance for COVID-19 was lower than that for human influenza (8 vs. 92 days). The median time to publication for COVID-19 articles was shorter than those on human influenza (12 vs. 16 days); 47.0% of COVID-19 research articles were accepted within the first week of submission, and 19.5% within one day. There were 82 retractions and withdrawals for COVID-19 articles, 1 for human influenza, and 5 for articles that contain both terms; these were mainly related to ethical misconduct, and 27 (31.0%) were published by the same group of authors in one highest-quartile journal.

Conclusions. The conundrum between fast publishing and adequate standards is shown in this analysis of COVID-19 research articles. The speed of acceptance for COVID-19 manuscripts was 11.5 times faster than for human influenza. The high number of acceptances within a day or week of submission and the number of retractions and withdrawals of COVID-19 papers might be a warning sign about the possible lack of a quality control process in scientific publishing and the peer review process.

# **Keywords**

Pandemics; COVID-19; influenza, human; retraction of publication as topic; scientific publication ethics; health communication; scientific misconduct.

After the SARS-CoV-2 coronavirus was identified in Wuhan, China, in late 2019, this virus quickly spread throughout the world, with the World Health Organization (WHO) declaring a pandemic on 12 March 2020. Since then, its progression has been reported almost in real-time by the world media, generating an overproduction of information, some more accurate and some

not, referred to as an information pandemic or "infodemic" (1, 2). In addition, there has been an avalanche of publications in record time in the scientific world, a phenomenon deemed a "paperdemic" (3–5).

The significant increase in publications on COVID-19, with an average of 137 research publications per day during the first



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months after the outbreak of the virus, makes us consider that not only have researchers been working with extremely high productivity but also that the editorial processes have been profoundly modified (3), speeding these up with the help of technological advances and publishing in preprint or ahead-of-print versions (6).

The editorial process in academic publishing consists of many stages through which manuscripts are handled between submission and publication. The receipt of the manuscript submission by the editorial office, the decision of the assigned editor to send for peer review, the peer review period and referee report, the acceptance or rejection decision, post-acceptance editorial management (copyediting and proofs), and finally, publication, are the typical steps during the process (7).

The peer review stage is the cornerstone of scientific publishing, and it can be described as the sequential process that summarizes the interactions between editors, reviewers, and authors (7). This process was introduced at the end of the 19th century to ensure quality and impartiality of the content in publications. Nevertheless, it is not exempt from criticism, mainly due to possible bias and the increased editorial processing time it may entail (8, 9). Furthermore, the accelerated production of information during the pandemic has taken academic publishing by surprise. The balance between reporting novel and breakthrough data is influenced by a continuously changing emergent global disease and the usual editorial process and turnaround times. As a result, academic publishing has been highly criticized during the pandemic, generating questions about the operation of the peer review process and the editorial decisions for manuscript publication. Some authors have criticized this accelerated production of information and have warned about an increase in retractions (3, 10, 11).

This article aims to describe the editorial processing times of published COVID-19 research articles and compare these with a similar topic, human influenza (FLU), during the year 2020, and the number of publications, withdrawals, and retractions was analyzed for the same period.

# **MATERIALS AND METHODS**

This is a descriptive-analytical study of data gathered from the PubMed database. The official webpage of the PubMed database (www.pubmed.com) was the data source, accessed by an online interface in January 2021 for all the research articles analyzed. Data extraction was executed with search strings for terms of articles indexed in this database. The strings were structured based on two main components: term search and time frames.

Three groups were defined for comparison based on medical subject headings (MeSH) and publishing date queries: Group 1, COVID-19: all research articles with the MeSH term "COVID-19" published between 1 January and 31 December 2020. Group 2, FLU20: all research articles with the MeSH term "influenza" published between 1 January and 31 December 2020. Group 3, FLU19: all research articles with the MeSH term "influenza" published between 1 January and 31 December 2019. The COVID-19 and FLU20 groups were used to compare the main variables of the study, and the FLU19 group was used as a reference for variables before the pandemic (the previous year).

For the analysis, research articles with at least two precise dates were included: date of receipt, date of acceptance, or online publication date. Articles that did not provide these data were excluded. The following variables were included in the analysis for comparisons to accurately describe the editorial processes, because they are the most frequently reported: time to acceptance (TA), the period between the receipt of the initial submission by the editorial office and the acceptance of the manuscript; time to publication (TP), the period from when an article is accepted until it is published online. Both variables were expressed in days. A consecutive sampling of research articles from any of the three periods under study was carried out and manually reviewed to validate the data obtained.

#### Search for retractions

The additional filter "article type" of the PubMed search engine was applied for each group. The document types selected were "retracted publication," "retraction of publication," and "withdrawn," which are usual indicators of retracted articles in the PubMed database. In addition, the information was supplemented using the Retraction Watch database (12). Only manuscripts indexed in PubMed and published during 2020 were included, and the last retraction update was 30 April 2021. The reasons for retraction or withdrawal were obtained from an assessment of each manuscript and its respective letters. The causes of retraction were classified through qualitative analysis.

# **Data extraction**

A connection via application programming interface (API) was used for data extraction, so the PubMed information was stored in .txt files and then converted to .csv (comma separated values) format. These records contained bibliographic reference data as proprietary fields used by PubMed. Publication History Status (PHST) was extracted from these fields, where the receipt, acceptance, review, and ahead-of-print dates are stored. These data were processed in MS Excel spreadsheets for statistical analysis.

# **Statistics**

Medians and interquartile ranges for continuous variables and frequencies and proportions for categorical variables were calculated. Nonparametric Kruskal–Wallis tests were used for multiple comparisons of publication times. Statistical analysis was performed using STATA 16 (StataCorp, College Station, TX, USA), with statistical significance set at a *p*-value of 0.05.

### **RESULTS**

The PubMed database indexed 31 319 COVID-19 research articles published during 2020, while there were 4 287 influenza virus articles during 2020 (FLU20) and 4 415 during 2019 (FLU19). Figure 1 shows the trend of influenza and COVID-19 publications between 2007 and 2020.

The TA and TP of COVID-19 articles were significantly shorter than FLU20. The TA for COVID-19 was 11.5 times faster

No.of articles per year Influenza A COVID-19 H1N1 pandemic pandemic Human influenza COVID-19 

FIGURE 1. Total number of COVID-19 and human influenza journal articles published by year, 2007–2020

Source: Prepared by the authors from the study results.

than FLU20, and TP was one-fourth of FLU20. TA and TP for FLU20 were shorter than FLU19 but to a minor degree (Table 1). Further, 47.0% of COVID-19 research articles were accepted within the first week of submission, compared with 6.7% of FLU20; while 19.5% of COVID-19 articles were accepted the same day or the day after they were received, compared with 4.8% for FLU20 (Figure 2).

The reasons for retractions mainly were related to ethical misconduct during the research process, such as plagiarism and self-plagiarism or authors' duplication in 14 of the 88 manuscripts retracted (15.9%); accidental duplication by the journal (10.2%); lack of confidence in the data (6.8%); ethical misconduct such as no informed consent, no authorization to use data, or lack of conflict of interest declaration (6.8%); early publication with errors in content, analysis, or methodology (9.1%); and fraud in the peer review process (2.3%). The cause was not explained in 48.9% of retractions and withdrawals (Table 2). It is of note that in one of the retractions the authors' alleged reason was inadvertent errors "that unfortunately passed unnoticed during the extremely rapid review and publication process at the peak of the COVID-19 pandemic" (13). Submission and acceptance dates for most of the retracted manuscripts are not

TABLE 1. Time to acceptance and time to publication for articles, comparing groups COVID-19 and human influenza 2020 and 2019

Group	Time to acceptance Time to publica		Time to publication
	п	Median (IQR)	Median (IQR)
COVID-19	11 924	8 (2-21)	12 (8–20)
FLU 2020	439	92 (49–159)	16 (8–37)
FLU 2019	507	106 (60-168)	24 (12-48)
		p < 0.000*	<i>p</i> < 0.000*

Notes: Time to acceptance: the interval from submission of the article to its acceptance; Time to publication: the interval from when the article is accepted until it is published online; IOR, interquartile range; FLU, human influenza; \*Kruskal-Wallis test.

Source: Prepared by the authors from the study results.

available. Most of the retracted and withdrawn COVID-19 and influenza papers were available online and citable at the time of this review.

The same group authored one-third of the withdrawn COVID-19 manuscripts, all of these in the same journal, which has an impact factor in the highest quartile of indexed journals.

20%

10%

180

2%

10%
90%
10%
80%
70%
60%
40%
40%
30%
Voundative frequency

FIGURE 2. Relative and cumulative frequencies of time to acceptance of original articles published during 2020 (expressed in days), comparing COVID-19 and human influenza

Notes: FLU, human influenza; COVID-19 cumulative, cumulative frequencies of COVID-19 publication time; FLU cumulative, cumulative frequencies of human influenza publication time. Source: Prepared by the authors from the study results.

80

TABLE 2. Reasons for retraction and withdrawal of COVID-19 and human influenza papers published during 2020 (data to 30 April 2021)

Days since submission

COVID-19

cumulative

100

120

FLU

cumulative

140

160

	COVID-19	COVID-19 and FLU	FLU
Duplication/plagiarism or self-plagiarism	14	0	0
Accidental duplication	9	0	0
Early publication with errors in content, analysis, or methodology	8	0	0
Other misconduct: data not authorized, lack of conflict-of-interest declaration, lack of informed consent	6	0	0
Data falsification or lack of confidence in the data	5	0	1
Fraudulent peer review	2	0	0
Not explained	38	5	0
Total	82	5	1

**Note:** FLU, human influenza. **Source:** Prepared by the authors from the study results.

20

40

60

COVID-19 FLU

# **DISCUSSION**

The main finding of this study is that the editorial processing time for COVID-19 research articles was 11.5 times shorter than for the human influenza articles during 2020. In addition, the editorial processing time of COVID-19 manuscripts was faster than the reported publication turnaround time of other subjects, which averages 4–5 months (14, 15). TA, which accounts for the peer review and editorial assessment stages, was primarily responsible for this finding. Almost 50% of the COVID-19 published articles were accepted for publication within one week and 20% within one day of receipt by the editorial office.

Earlier publications have warned of the acceleration of editorial processing speed during the current pandemic (16, 17). The shorter TP could be explained by the improving and automating of parts of the revision processes that depend on each publisher. However, the shortening of the TA depends exclusively on human inputs, such as by editors, reviewers, and authors (7). As expected, when comparing FLU19 and FLU20, the latter had a shorter total editorial time, but these differences were minor compared with the high publication speed for the COVID-19 group.

In a study of the publication processes of 14 medical journals, both during and before the current pandemic, Horbach concluded that the time between submission and publication had decreased on average by 49% for coronavirus-related articles, mainly due to a decrease in peer review stage time. On the contrary, the publication process was not faster when analyzing articles not related to COVID-19 (16).

The shorter editorial process, which made articles available quickly, was initially thought to be an advantage in describing and studying a new disease. However, it seems that a flawed peer review process during the first year of the pandemic may have been, at least in part, the reason for the shorter editorial process in many cases. The weakness of this crucial stage in quality control (i.e., scientific, ethical, relevance) might be related to an increase in the rate of errata and retractions (13), which is higher than for influenza and an estimated three times higher than for other viruses related to pandemics or epidemics (3, 18). Furthermore, because the reported time to retraction in previous studies is usually between two and three years, the number of retracted COVID-19 manuscripts will likely increase in the following years (19).

Steen et al. reported that one-third of retracted articles were written by authors with multiple retracted manuscripts (19). In the current analysis, one-third of the COVID-19 retractions were written by the same group of authors, with 27 retractions in 2020. The reasons for retraction were fundamentally related to the ethical integrity of the research processes, exposing a serious bias and even a lack of truthfulness of the raw data and analysis (20). It is of concern that the reasons for retraction are not specified in half of the COVID-19 publications, higher than the usual 10% reported in the past for many topics (21).

Interestingly, the withdrawn and retracted manuscripts are still accessible and can be cited, giving rise to concerns around the solidity of the scientific evidence base (22). Bar-Ilan and Halevi reported that most citations to retracted articles are positive despite the clear retraction notice on the publisher's platform—even for papers that were retracted due to ethical misconduct, data fabrication, and false reports (23).

This study has some limitations. The search was limited to a single database and the analysis only included published articles with precise dates, which may constitute a selection bias. Furthermore, we have no information on manuscripts rejected during the period. In addition, we noticed that there are no standardized requisites regarding the data of the editorial process among different publishers; thus, some relevant articles had to be excluded. This fact shows that transparency is still a problem in academic publishing, despite some innovations implemented in recent years, such as open peer review, tracking of published manuscripts, and post-publication peer review.

Despite these limitations, this study raises a word of caution regarding the unprecedented large amount of published COVID-19 articles, the short editorial processing times, and, in

many cases, the absence of a proper peer review, resulting in a fast-growing number of COVID-19 retractions and withdrawals. It is essential to establish a balance between the benefits of rapid access to information with the risk of publishing articles with errors or ethical transgressions, especially in the face of a global threat such as a pandemic (4, 11).

The "paperdemic" can affect the response to the pandemic at many levels. For instance, clinicians, policymakers, and government have appealed for the scientific knowledge to implement measures to modify the course of the pandemic (24–26). Therefore, the availability of strong scientific evidence is crucial for experts to be able to come up with robust health policies, rather than contradictory and ever-changing measures affecting millions of people, raising costs, and jeopardizing other health measures for the general public.

In view of the information analyzed, it is necessary to appeal to the wisdom of the community of authors, researchers, editors, reviewers, and readers to make the peer review process transparent and to open a debate based not only on the results but also on the methodology, analysis, and interpretation of the research. Only after detailed scrutiny will policymakers and clinicians be able to make the most appropriate decisions.

#### Conclusion

The COVID-19 pandemic has exposed many flaws in current scientific and academic publishing. The editorial processes of published articles on COVID-19 have been drastically changed, resulting in an extraordinary number of publications and fast editorial processing times. For example, the speed of acceptance of manuscripts was 11.5 times faster for the COVID-19 group than for the human influenza (FLU20) group during 2020. The downside of this is the high number of fast-track research articles, many of them approved within a day or week of submission. This is a warning sign for a possible weakness in the quality control process of scientific publishing and in the peer review process, which could be associated with a high number of withdrawn and retracted manuscripts.

**Author contributions.** LS and ICR conceived the original idea. ICR collected the data. IO, VP, and DH analyzed the data and interpreted the results. LS, ICR, and FD analyzed the data and wrote the paper. All authors reviewed and approved the final version.

Conflict of interest. None declared.

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# Velocidad de publicación y retractación de artículos originales sobre la pandemia de COVID-19

#### **RESUMEN**

**Objetivo.** Describir el tiempo de procesamiento editorial de los artículos de investigación sobre la COVID-19 publicados, compararlo con un tema similar, la gripe humana, y analizar el número de publicaciones realizadas, el de artículos retirados y el de retractaciones.

**Métodos.** Usando PubMed, se llevó a cabo un estudio descriptivo y analítico sobre artículos de investigación con los términos en inglés correspondientes a "gripe humana" y "COVID-19" en el MeSH. Se compararon el tiempo de aceptación (desde la presentación hasta la aceptación) y el tiempo de publicación (desde la aceptación hasta la publicación). Se examinaron las publicaciones retiradas y las retractaciones de manera cualitativa y cuantitativa.

**Resultados.** Hubo 31 319 artículos de investigación sobre la COVID-19 y 4 287 sobre la gripe humana publicados en el año 2020. La mediana del tiempo de aceptación de los artículos sobre la COVID-19 fue inferior que la mediana de la gripe humana (8 días en contraste con 92 días). La mediana del tiempo de publicación de los artículos sobre la COVID-19 fue menor que la de los artículos sobre la gripe humana (12 días en contraste con 16 días). El 47,0 % de los artículos de investigación sobre la COVID-19 se aceptaron en la primera semana de presentación, y el 19,5 %, en un día. Hubo 82 retractaciones y retiradas de artículos sobre la COVID-19, una sobre la gripe humana y 5 de artículos que contenían ambos términos; estas retractaciones y retiradas estuvieron relacionadas principalmente con faltas de conducta ética. Además, hubo 27 artículos (31,0 %) publicados por el mismo grupo de autores en una revista de cuartil más alto.

**Conclusiones.** El dilema entre la publicación rápida y unas normas adecuadas se muestra en este análisis de artículos de investigación sobre la COVID-19. La velocidad de aceptación de los manuscritos sobre la COVID-19 fue 11,5 veces mayor que la velocidad de aceptación de los artículos sobre la gripe humana. El alto número de aceptaciones en un día o una semana desde la presentación y el número de retractaciones y retiradas de artículos sobre la COVID-19 podría ser un signo de advertencia acerca de la posible falta de un proceso de control de calidad en las publicaciones científicas y especialmente en el proceso de arbitraje.

#### **Palabras clave**

Pandemias; COVID-19; gripe humana; retractación de publicación como asunto; ética en la publicación científica; comunicación en salud; mala conducta científica.

# Velocidade de publicação científica e retratação de artigos originais sobre a pandemia de COVID-19

# **RESUMO**

**Objetivo.** Descrever o tempo de processamento editorial dos artigos de pesquisa publicados sobre COVID-19, compará-lo com o de artigos sobre um tema semelhante (gripe humana) e analisar o número de publicações, suspensões e retratações.

**Métodos.** Estudo descritivo-analítico. Foi realizada uma busca no PubMed usando os descritores MeSH "human influenza" e "COVID-19". O tempo até a aceitação (da submissão à aceitação) e o tempo até a publicação (da aceitação à publicação) foram comparados. Retratações e suspensões foram analisadas qualitativa e quantitativamente.

**Resultados.** Foram publicados 31 319 artigos de pesquisa sobre a COVID-19 e 4 287 sobre a gripe humana em 2020. O tempo médio de aceitação de artigos sobre COVID-19 foi menor que o de artigos sobre gripe humana (8 *versus* 92 dias). O tempo médio até publicação dos artigos sobre COVID-19 foi menor que o de artigos sobre gripe humana (12 *versus* 16 dias); 47,0% dos artigos sobre COVID-19 foram aceitos na primeira semana após a submissão, e 19,5%, dentro de um dia. Houve 82 retratações e suspensões de artigos sobre COVID-19, 1 sobre gripe humana, e 5 de artigos que continham ambos os termos, principalmente relacionadas a má conduta ética; 27 (31,0%) desses artigos foram publicados pelo mesmo grupo de autores, em uma revista do mais alto quartil.

**Conclusões.** O dilema entre publicar rapidamente e manter padrões adequados fica claro nesta análise de artigos sobre COVID-19. Manuscritos sobre COVID-19 foram aceitos 11,5 vezes mais rapidamente do que artigos sobre gripe humana. O alto número de aceitações em um dia ou semana após a submissão e o número de retratações e suspensões de artigos sobre COVID-19 alertam sobre uma possível falta de controle de qualidade na publicação científica e no processo de revisão por pares.

# Palavras-chave

Pandemias; COVID-19; influenza humana; retratação de publicação como assunto; ética na publicação científica; comunicação em saúde; má conduta científica.