

Completeness Of Reporting For COVID-19 Case Reports, January to April 2020: A Meta-Epidemiologic Study

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ABSTRACT

Background: We aimed to determine the completion of reporting (COR) for case reports published on COVID-19.

Methods: We conducted a systematic search of the MEDLINE database for all single-patient case reports of confirmed COVID-19 published between January 1, 2020 to April 24, 2020. All included case reports were assessed for adherence to Case Report (CARE) guidelines that consists of 31 items, which was used to create a composite COR score. The primary outcome was the mean COR score assessed by two independent raters.

Results: Our search identified 96 studies that were published in 67 journals. We found that the overall mean COR score was 62.6%. No one case report that included all of the 31 CARE checklist items. Articles published in the two-month period of January-February had a significantly lower mean COR scores compared to articles published in March-April ($P=0.026$, $d=0.6$). We did not identify any other significant factors that affected COR.

Interpretation: We found that the overall COR for case reports on COVID-19 was poor, and was significantly lower at the beginning of the pandemic. We recommend that journals adopt common case reporting standards to improve reporting quality.

Key words: COVID-19; Critical appraisal; Case Reports; Meta-epidemiologic

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic demands rapid access to high quality evidence. Case reports often provide the first published evidence for a disease, as they can detect novelties, generate hypotheses for future research, and offer insight into rare exposures and outcomes(1–4). In the early stages of an emerging infectious disease, case reports become integral pieces of evidence for interim planning and treatment decisions while higher quality observational and interventional studies are pending(4–6). There are concerns, however, that a rush to publication will result in poorer research quality during the current COVID-19 pandemic(7–9).

One area that may be adversely affected by this rush is research reporting quality. As with all research, case reports should meet strict requirements for completeness of reporting (COR) to ensure access to relevant information(10,11). Specifically, they should follow the Case Report (CARE) Statement and Checklist, a guideline that indicates best practices in case reporting(11). The most recent version, which was updated in 2016, covers 14 topic areas with a total of 31 checklist items(10). Several studies across a variety of domains and journals have evaluated COR for case reports by calculating a composite score of the number of CARE checklist items that were complete(12–16).

No studies have investigated the quality of reporting on COVID-19(9,17). Our aim was to determine COR of case-reports related to COVID-19, with a hypothesized overall

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COR score lower than the “acceptable” threshold of 75%(12). The secondary objectives involved determining whether COR was impacted by time of publication, print status, open access status and journal policies regarding CARE and publication ethics.

METHODS

We performed a meta-epidemiologic study modelled upon a similar study that examined COR for case reports(12). Reporting of our findings followed guidelines for the reporting of meta-epidemiological methodology research(18).

Ethics approval

We obtained an exemption from the research ethics board at our institution, as there was no primary patient data involved.

Definitions

According to the original CARE guideline publication, a case report is a “detailed narrative that describe[s], for medical, scientific, or educational purposes, a medical problem experienced by one or several patients”(11). To operationalize this definition, we considered ‘case reports’ to be any publications that had clinical information presented for a single patient. This included imaging reports, problem-solving cases, and correspondence.

Study selection

We conducted a systematic search using a modification of the strategy proposed by the Centre for Disease Control (CDC) search recommendation for COVID-19(19). The full search can be found in **Appendix A**. We executed the search in Ovid MEDLINE for all case reports published between the dates of January 1, 2020 to April 24, 2020.

Two authors (MAS, JL) performed an initial screen of the abstracts. We retrieved full texts all included abstracts. Two reviewers (MAS, NG) independently conducted the full text review, wherein any disagreements were resolved by consensus. We included studies if they were case reports of a single patient diagnosed with COVID-19 that were published online between January 1, 2020 to April 24, 2020. We excluded the following: reports with an unconfirmed diagnosis of COVID-19; non-primary studies (e.g. editorials without clinical data); studies with full texts that could not be obtained and/or are not available in English; studies without a digital object identifier (DOI); animal studies; and studies presenting clinical information for more than one patient.

CARE Statement

The CARE checklist was initially developed in 2013 using a Delphi process in order to ensure COR for case reports(11). The checklist was updated in 2016 to include a fourteenth topic, making for a total of 31 checklist items(10). We used this version for our evaluation and identified the following sections as particularly relevant to clinical practice in COVID-19: patient information; diagnostic assessment; therapeutic intervention; and follow-up and outcomes.

Data Extraction

We extracted bibliographic data using a standardized form that included the following data: date of publication; and the number of authors on each paper. The print status of the article as journal pre-print, post-print or published was determined based on the article downloaded from the journal website. We determined whether the journal explicitly endorsed either CARE guidelines and/or the Enhancing the Quality and Transparency of Health Research (EQUATOR) network on the 'For Authors' sections of their webpage; and whether journals were members of the Committee on Publication Ethics (COPE) using the search function on the COPE website(20).

Two authors (MAS, NG) conducted the critical appraisal using the CARE checklist and rated each item as either "present" or "absent". A pilot data extraction was conducted on studies that were not included in the search. The two authors then independently reviewed each case report for CARE checklist items, following recommendations for CARE guidelines(10). The authors reviewed the full-texts downloaded from the journal website, in an approach designed to mimic that of the casual reader. All journal texts were downloaded as of April 24, 2020.

Databases

All data was obtained on May 3, 2020. For information on open access status, we used the Simple Query Tool from Unpaywall (Our Research, Vancouver, Canada), a publicly-accessible platform that indexes papers open access information(21). For citation count, we used institutional access to the Web of Science (Clarivate™, Philadelphia, USA)(22). For social media attention, we used Altmetric Explorer (Digital Science, London, UK), which tracks mentions of the publications across online sites and social media(23). For bibliometric information, we used institutional access to Ulrich's Periodicals Directory (ProQuest LLC, Ann Arbor, USA), a database that provides information on academic publications(24). For journal impact factor and total citation count, we used institutional access to the InCites Journal Citation Reports system (Clarivate™, Philadelphia, USA)(25).

Outcome measures

The primary outcome was the overall COR score for case reports related to COVID-19, with a focus on clinically relevant items. Secondary outcomes included analysis that determined whether there was a change in overall COR score with time of publication, journal endorsement of CARE, open access status, and journal membership in COPE. We also determined whether there was a linear relationship between COR and citation count and between COR scores and social media attention.

Statistical Analysis

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All statistical analyses were completed in SPSS version 25 (IBM, Armonk, NY). Descriptive statistics of mean with standard deviation (SD) and median with interquartile range (IQR) were used as appropriate. According to a previous study(12), the completeness of reporting (COR) score was calculated using the following equation:

Equation 1. *COR Score (%)*= [\sum *Present items*/ \sum (31)]*100

The mean COR score was calculated using assessments from both raters. To ensure transparency in reporting(26), we also calculated both a mean and median COR score for all items of the CARE statement and for each study section.

The normality of the distribution for the COR scores was assessed using the Shapiro-Wilk test and Q-Q plots where appropriate(27). Inter-rater agreement was assessed for each CARE item using proportion percentage agreement and for the overall COR scores using the intraclass correlation coefficient (ICC)_{2,1} (two-way random-effect model for average measures [the average of 2 raters' scores]).

To evaluate a difference in the mean COR scores with the hypothesized threshold of 75%, we used a one sample t-test. To evaluate a difference in the mean COR scores with the variables of CARE endorsement, COPE membership, and open access status, we used an independent samples t-test. To evaluate a difference in the mean COR scores with the variables of print status (i.e. pre, post, published), we used a one-way analysis of variance (ANOVA) with independent samples t-tests for post hoc analysis.

To determine whether there was a linear relationship between mean COR scores with Attention Score and with article citation count, Pearson's correlation coefficient was used.

Effect size was measured using Cohen's *d*. All statistical tests used an α of 0.05.

RESULTS

Study characteristics

Of the 195 studies found in our initial search, we included 96 case reports that were published in 67 different journals for quantitative analysis. The bibliographic characteristics of the included studies are summarized in **Table 1**. A more detailed summary for each study is provided in **Appendix B**.

Table 1. Bibliometric characteristics of included case reports

Characteristic		Values
Journal level	Unique journal count (<i>n</i>)	67
	Open access journal, <i>n</i> (%)	20 (29.8%)
	COPE membership, <i>n</i> (%)	42 (62.7%)
	CARE or EQUATOR endorsement, <i>n</i> (%)	18 (26.9%)
Article level	Article Count	96
	Open access article, <i>n</i> (%)	92 (95.8 %)

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Number of authors, mean (SD)	7.1 (4.9)
Citation count ^a , mean (SD)	3.4 (15.4)
Attention Score ^a , mean (SD)	259.3 (1111.7)
Print status ^b , <i>n</i> (%)	
Pre-print	2 (2.10%)
Post-print	20 (20.8%)
Published	74 (77.1%)

COPE, Committee on Publication Ethics; *CARE*, Case Report checklist and statements; *EQUATOR*, Enhancing the Quality and Transparency of Health Research.

SD, standard deviation

^a Determined as of May 03, 2020

^b Determined as of April 24, 2020

The included case reports were published between January 4, 2020 and April 23, 2020. A summary of the month of publication for the included case reports with corresponding mean COR score is provided in **Figure 1**.

Figure 1. Search flow. COVID-19, coronavirus 2019; DOI, digital object identifier

Primary outcome

The mean COR score for the two raters was 62.6% (standard deviation [SD]=15.5), which was significantly less than the hypothesized threshold of 75% ($t_{95} = -7.8$, $P < 0.001$). The ICC(2,1) of average measures for the overall COR score was 0.92 (95% confidence interval [95% CI]: 0.87-0.94), which indicates excellent agreement.

There was no one case report that included all of the 31 CARE checklist items (**Table 2**). The three clinically relevant items with the highest COR scores were: “Diagnostic methods” (median COR=98%); “Diagnostic reasoning” (median=95%); and “Types of intervention” (median COR=88%). The three clinically relevant items with the lowest COR scores were: “Diagnostic challenges” (median COR=16%); “Intervention adherence and tolerability” (median=20%); and “Adverse and unanticipated events” (median COR=28%).

TABLE 2. Completeness of reporting (COR) scores for each CARE topic and question

Topic	Item	Question	Median	Mean
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			COR per topic (%)	COR per item (%)
Title	1	The words “case report” should be in the title along with what is of greatest interest in this case	34	34
Keywords	2	The key elements of this case in 2-5 key words	52	52
Abstract	3a	Introduction – what is unique about this case? What does it add to the medical literature?	59	63
	3b	The main symptoms of the patient and the important clinical findings		46
	3c	The main diagnoses, therapeutics interventions, and outcomes		57
	3d	Conclusion – what were the main “take away” lessons from this case?		60
Introduction	4	Brief background summary of this case referencing the relevant medical literature	76	76
Patient Information	5a	Demographic information (such as age, gender, ethnicity, occupation)	87	100
	5b	Main symptoms of the patient (chief complaints)		98
	5c	Medical, family, and psychosocial history including comorbidities, and relevant genetic information		76
	5d	Relevant past interventions and their outcomes		52
Clinical Findings	6	Describe the relevant physical examination (PE) findings	82	82
Timeline	7	Depict important milestones related to your diagnoses and interventions (table or figure)	46	46

Diagnostic	8a	Diagnostic methods (such as PE, laboratory testing,	59	98
Assessment		imaging, questionnaires)		
	8b	Diagnostic challenges (such as financial, language, or		16
		cultural)		
	8c	Diagnostic reasoning including other diagnoses considered		95
	8d	Prognostic characteristics (such as staging in oncology)		23
		where applicable		
Therapeutic	9a	Types of intervention (such as pharmacologic, surgical,	67	88
Intervention		preventive, self-care)		
	9b	Administration of intervention (such as dosage, strength,		67
		duration)		
	9c	Changes in intervention (with rationale)		59
Follow-up	10a	Clinician-assessed outcomes and, when appropriate,	52	85
and		patient-assessed outcomes		
Outcomes				
	10b	Important follow-up test results		76
	10c	Intervention adherence and tolerability (how was this		20
		assessed?)		
	10d	Adverse and unanticipated events		28
Discussion	11a	Discussion of the strengths and limitations in the	86	53
		management of this case		
	11b	Discussion of the relevant medical literature		86
	11c	The rationale for conclusions (including assessment of		85
		possible causes)		
	11d	The main “take-away” lessons of this case report		91
Patient	12	Did the patient share his or her perspective or experience?	1.6	1.6
Perspective		(Include when appropriate)		

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Informed	13	Did the patient give informed consent? Please provide if	39	39
Consent		requested		
Additional	14	Acknowledgement section; Competing interests; IRB	89	89
Information		approval when required		

Secondary outcomes

We found a significant difference in mean COR scores for articles published in the two-month period of January-February compared with March-April, where earlier published case reports possessed a lower mean COR score compared to those published later (54.1 vs. 64.1, respectively; $t_{94} = -2.3$, $P = 0.026$, $d = 0.6$).

Figure 2. Number of case reports published on COVID-19 from the beginning of 2020 to the date of the search (April 24, 2020) with corresponding mean completeness of reporting (COR) scores. COR, completeness of reporting.

We did not find significant differences in mean COR scores for the following analyses: journals that endorsed CARE guidelines compared to those that did not (64.4 vs 59.1, respectively; $t_{47.3} = -1.4$, $P = 0.163$); open access articles compared to those that were not (62.5 vs 65.3, respectively; $t_{94} = 0.4$, $P = 0.725$); articles published in open access journals compared to those that were not (62.2 vs. 62.7, respectively; $t_{94} = -0.1$, $P = 0.884$); articles published in journals with COPE membership compared to those that were not (63.5 vs. 61.2, respectively; $t_{94} = 0.7$, $P = 0.486$); and for articles available as pre-print, post-print, and published (54.8 vs. 69.4 vs. 61.0, respectively; $F_{2,95} = 2.7$, $P = 0.074$).

There was no significant linear relationship in mean COR scores with Attention Score ($R=0.038$, $P=0.721$) or with article citation count ($R= -0.031$, $P=0.761$). There were 6 studies for which Attention score was not available.

INTERPRETATION

We identified 96 case reports on COVID-19 published in 67 different journals from January to April, 2020. Overall, the completeness of reporting was poor, with a mean COR of 62.6%. No single case report contained all the items in CARE guidelines. Furthermore, the clinically relevant items that were most poorly reported pertained to diagnostic challenges, therapeutic adherence/tolerability and adverse/unanticipated events. Finally, mean COR scores significantly improved over the latter half of the four month period we assessed. No other factors significantly impacted COR and there was no correlation of COR with either social media attention or article citation count. This is the first known study to comprehensively investigate the quality of reporting for evidence related to COVID-19(9,17).

Although classically considered low quality evidence(4), case reports become critically important during the early stages of pandemics(6). During the 2009 H1N1 pandemic, for example, case reports and other observational studies were among the earliest types of evidence available to inform clinical practice and facilitate knowledge dissemination to the global community(5,28,29). Specifically, these case descriptions aided the early understanding of the disease(28), as they informed clinical presentation,

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epidemiological preferences and outcomes. Furthermore, case reports serve as the foundation for higher-quality follow-up studies with larger sample sizes(3). This is illustrated by a bibliometric analysis of literature from the Middle Eastern Respiratory syndrome (MERS) outbreak, which found that case reports were among the top 10 cited publications from this period(30). In short, case reporting is a highly flexible medium that can be strategically pivoted during disease outbreaks and it frequently forms the “first line of evidence”(31).

Our findings, however, demonstrate that this front line can be easily undermined with poor reporting. In particular, it is worrisome that COR scores were significantly lower in the period of January to February, when high-quality case reports would have provided substantial guidance on treatment decisions and research hypotheses(3,6). Furthermore, poor reporting in the clinically relevant areas of intervention adherence, tolerability, and adverse events exacerbates the concern around decision-making regarding unproven therapies in critically ill patients(3,6). The literature, however, shows that incomplete reporting is not unique to the current COVID-19 pandemic. A report by the World Health Organization (WHO) on the H1N1 pandemic(28), for example, found that important components of case records were incomplete, which negatively impacted the lines of communication.

We also found that COR did not correlate with either article citation or social media attention. One interpretation is that readers do not preferentially consider quality of reporting when citing or discussing case reports. As a result, we believe that ensuring

adequate reporting is best accomplished through endorsement of reporting guidelines by each journal. This has been demonstrated for more robust forms of evidence such as randomized controlled trials (RCT), where journal endorsement of Consolidated Standards of Reporting Trials (CONSORT) improved overall COR(32). In terms of case reports, one study found that endorsement of CARE guidelines among four high impact medical journals positively improved COR(12).

Journal endorsement alone, however, may prove insufficient. For RCTs, for example, reporting quality was still suboptimal even with CONSORT endorsement, with the authors suggesting that journals should implement stronger measures to ensure COR(32). We recommend that journals employ large scale adoption of standardized documentation to improve the completeness of case reporting(29). This approach lent itself especially well to pandemics in the case of registries, where calls for standardization of case report forms (CRFs) across registries during the early stages of the 2009 H1N1 pandemic improved their ability to support for future research(5), and were also shown to be globally feasible(33).

Our study has several limitations. First, we only included single-patient case reports, which restrict the generalizability of our findings to this specific type of study. Second, we excluded all studies with full texts that were not published in English, which may have introduced a language bias. Third, CARE guidelines are intended for clinical reports, which may limit their generalizability to imaging reports and correspondence. Finally, the use of CARE guidelines to assess COR, while previously reported(12–

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14,16), likely imputed a degree of subjectivity, as the guidelines do not specify the depth or explicitness of completeness required for each topic. Nevertheless, the overall inter-rater agreement of the COR scores was high, suggesting that this approach has good reliability.

In summary, the overall reporting quality of COVID-19 case reports was poor. At a systemic level, we recommend the wide scale adoption of a common standard for case reporting by journals. Future studies should comprehensively investigate the quality of reporting among other types of evidence for COVID-19, including other observational studies, randomized controlled trials and systematic reviews.

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DATA SHARING STATEMENT

Study data is available upon request.

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APPENDIX

Quality of COVID-19 Case Reports

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Appendix A. Search strategy

((coronavirus OR "corona virus" OR coronaviridae OR coronaviridae OR betacoronavirus OR covid19 OR "covid 19" OR ncov OR "CoV 2" OR CoV2 OR sarscov2 OR 2019nCoV OR "novel CoV" OR "wuhan virus") OR ((wuhan OR hubei OR huaian) AND ("severe acute respiratory" OR pneumonia) AND (outbreak)) OR "Coronavirus"[Mesh] OR "Coronavirus Infections"[Mesh] OR "COVID-19"[Supplementary Concept] OR "severe acute respiratory syndrome coronavirus 2"[Supplementary Concept] OR "Betacoronavirus"[Mesh]) AND case report

Confidential

Appendix B. Descriptive information of the included articles

First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
Adair, LB	Covid-19 pneumonia in a kidney transplant recipient successfully treated with Tocilizumab and Hydroxychloroquine.	USA	Radiology case reports	USA	Yes	Published
Adams, E	COVID-19 infection and treatment with hydroxychloroquine cause severe haemolysis crisis in a patient with glucose-6-phosphate dehydrogenase deficiency.	USA	Journal of vascular surgery cases and innovative techniques	Netherlands	Yes	Post-print
An, P	Achieving a Popliteal Venous Access for RRT in Critically Ill COVID-19 Patient in Prone position.	China	The Balkan Medical Journal	Turkey	Yes	Published
Arpali, E	COVID-19 and intracerebral haemorrhage: causative or coincidental?	Turkey	Transplant Infectious Disease	USA	No	Post-print
Asadollahi-Amin, A	A man in his nineties with fever and dry cough.	Iran	Tropical Medicine and Infectious Disease	Switzerland	Yes	Published
Bartiromo, M	An Atypical Presentation of Novel Coronavirus Disease 2019 (COVID-19).	Italy	Transplant Infectious Disease	USA	Yes	Post-print
Beauverd, Y	A Case of SARS-CoV-2-pneumonia with successful antiviral therapy in a 77-year-old male with heart transplant.	Switzerland	European journal of haematology	Denmark	Yes	Post-print
Bemtgen, X	A sporadic COVID-19 pneumonia treated with extracorporeal membrane oxygenation in Tokyo, Japan: A case report.	Germany	ASAIO Journal	USA	Yes	Post-print
Bettari, L	COVID-19 in a MS patient treated with ocrelizumab: does immunosuppression have a protective role?	Italy	JACC: Case Reports	USA	Yes	Published
Borén, HK	Case Report: The Importance of Novel Coronavirus Disease (COVID-19) and Coinfection with Other Respiratory Pathogens in the Current Pandemic.	Norway	Tidsskrift for den Norske laegeforening	Norway	Yes	Published

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First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
Buonsenso, D	Case Report: Hepatotoxicity Associated with the Use of Hydroxychloroquine in a Patient with Novel Coronavirus Disease (COVID-19).	Italy	European Review for Medical and Pharmacological Sciences	Italy	No	Published
Bussalino, E	Case Report: The First Case of Novel Coronavirus Disease (COVID-19) in Bhutan.	Italy	American Journal of Transplantation	USA	Yes	Post-print
Canarutto, D	COVID-19 complicated by Acute Pulmonary Embolism and Right-Sided Heart Failure.	Italy	Pediatric Pulmonology	USA	Yes	Published
Casey, K	Morbilloform Exanthem Associated with COVID-19.	USA	The American journal of emergency medicine	USA	Yes	Published
Chang, D	Guillain-Barré Syndrome associated with SARS-CoV-2 infection.	USA	Heart Rhythm Case Reports	Netherlands	Yes	Published
Chau, VQ	Veno-venous extracorporeal membrane oxygenation for severe pneumonia: COVID-19 case in Japan.	USA	JACC: Case Reports	USA	Yes	Published
Chen, D	Chest CT Findings of Early and Progressive Phase COVID-19 Infection from a US Patient.	China	International Journal of Infectious Diseases	UK	Yes	Published
Cheng, SC	Guillain Barre syndrome associated with COVID-19 infection: A case report.	Taiwan	Journal of the Formosan Medical Association	Hong Kong	Yes	Published
Deng, Z	COVID-19 pneumonia with hemoptysis: Acute segmental pulmonary emboli associated with novel coronavirus infection.	China	Journal of Medical Virology	USA	No	Published
Duan, YN	Documented early circulation of Coronavirus Disease 2019 (COVID-19) in Florida, USA, since February 2020.	China	Radiology	USA	Yes	Published

First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
El Kassas, M	Venous thrombosis and arteriosclerosis obliterans of lower extremities in a very severe patient with 2019 novel coronavirus disease: a case report.	Egypt	Digestive Endoscopy	Australia	Yes	Post-print
Fabre, O	Novel Coronavirus Disease 2019 in a Patient on Durable Left Ventricular Assist Device Support.	France	The Annals of Thoracic Surgery	USA	Yes	Pre-print
Falcão, MB	Severe Acute Proximal Pulmonary Embolism and COVID-19: A Word of Caution.	Brazil	The American journal of tropical medicine and hygiene	USA	Yes	Published
Fang, X	A case of COVID-19 patient with the diarrhea as initial symptom and literature review.	China	QJM An International Journal of Medicine	UK	Yes	Published
Feng, H	First successful treatment of COVID-19 induced refractory cardiogenic plus vasoplegic shock by combination of pVAD and ECMO - a case report.	China	Japanese Journal of Radiology	Japan	Yes	Published
Fontana, F	A COVID-19 Patient Who Underwent Endonasal Endoscopic Pituitary Adenoma Resection: A Case Report.	Italy	American Journal of Transplantation	USA	Yes	Post-print
Fu, D	Case Report: A Kidney Transplant Patient with Mild COVID-19.	China	Nephron	Switzerland	Yes	Published
Guillen, E	A case of a readmitted patient who recovered from COVID-19 in Chengdu, China.	Spain	American Journal of Transplantation	USA	Yes	Published
Hamer, OW	Exploring Personal Protection During High-Risk PCI in a COVID-19 Patient: Impella CP Mechanical Support During ULMCA Bifurcation Stenting.	Germany	Thieme Röfo	Germany	Yes	Published
Han, X	The Imperfect Cytokine Storm: Severe COVID-19 with ARDS in Patient on Durable LVAD Support.	China	Journal of Thoracic Imaging	USA	Yes	Published
Hase, R	Coronavirus Disease 2019 (COVID-19) Pneumonia in a Hemodialysis Patient.	Japan	Infectious Diseases	UK	Yes	Published

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First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
Hillaker, E	Collapsing Glomerulopathy in a Patient With Coronavirus Disease 2019 (COVID-19).	USA	Pharmacotherapy	USA	Yes	Post-print
Holshue, ML	COVID-19 Infection Unmasking Brugada Syndrome.	USA	The New England Journal of Medicine	USA	Yes	Published
Hosoda, T	Severe Pneumonia Due to SARS-CoV-2 and Respiratory Syncytial Virus Infection: A Case Report.	Japan	Infection Control & Hospital Epidemiology	USA	Yes	Published
Huang, JF	Emergency endoscopic variceal band ligation in a COVID-19 patient presented with hematemesis while on mechanical ventilation.	China	American Journal of Transplantation	USA	Yes	Post-print
Inciardi, RM	A novel presentation of COVID-19 via community acquired infection.	Italy	JAMA Cardiology	USA	Yes	Published
Jansen, JH	Breadth of concomitant immune responses prior to patient recovery: a case report of non-severe COVID-19.	USA	Visual Journal of Emergency Medicine	USA	Yes	Published
Jin, XH	Immunosuppressive therapy maintenance in a kidney transplant recipient SARS-CoV-2 pneumonia: a case report.	China	The Lancet Hematology	UK	Yes	Published
Kamali Aghdam, M	Delayed Initiation of Remdesivir in a COVID-19 Positive Patient.	Iran	Infectious Diseases	UK	Yes	Published
Khaddour, K	Threatening drug-drug interaction in a kidney transplant patient with Coronavirus Disease 2019 (COVID-19).	USA	The American journal of tropical medicine and hygiene	USA	Yes	Published
Kim, J	Fatal outcome in a liver transplant recipient with COVID-19.	USA	The American Journal of Emergency Medicine	USA	Yes	Published
Kim, JY	Novel Coronavirus (SARS-CoV-2) Infection in A Renal Transplant Recipient: Case Report.	China	Journal of Korean Medical Science	Korea	Yes	Published
Larsen, CP	First case of COVID-19 complicated with fulminant myocarditis: a case report and insights.	USA	Kidney International Reports	USA	Yes	Published

First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
Lei, J	Myocardial localization of coronavirus in COVID-19 cardiogenic shock.	China	Radiology	USA	Yes	Published
LeVine, S	Abdominal and testicular pain: An atypical presentation of COVID-19.	Bhutan	The American journal of tropical medicine and hygiene	USA	Yes	Published
Li, XJ	Lung Involvement Found on Chest CT Scan in a Pre-Symptomatic Person with SARS-CoV-2 Infection: A Case Report.	China	Critical Care	USA	Yes	Published
Lim, J	Successful treatment of COVID-19 using extracorporeal membrane oxygenation, a case report.	Republic of Korea	Journal of Korean Medical Science	Korea	Yes	Published
Lin, C	Chest radiography and computed tomography findings from a Brazilian patient with COVID-19 pneumonia.	China	Clinical Imaging	USA	Yes	Published
Lin, J	A case report of COVID-19 with false negative RT-PCR test: necessity of chest CT.	China	Pediatric Pulmonology	USA	Yes	Published
Liu, B	A first case of meningitis/encephalitis associated with SARS-Coronavirus-2.	China	American Journal of Transplantation	USA	Yes	Published
Liu, P	COVID-19 infection in a paucisymptomatic infant: Raising the index of suspicion in epidemic settings.	China	Radiology	USA	Yes	Published
Lv, DF	Tocilizumab, an anti-IL6 receptor antibody, to treat Covid-19-related respiratory failure: a case report.	China	Clinica Chimica Acta	Netherlands	Yes	Published
Mathies, D	The isolation period should be longer: Lesson from a child infected with SARS-CoV-2 in Chongqing, China.	Germany	American journal of transplantation	USA	Yes	Post-print
Michot, JM	Successful treatment of severe COVID-19 pneumonia in a liver transplant recipient.	France	Annals of Oncology	UK; Netherlands	Yes	Post-print
Miglietta, A	SARS Cov2 infection in a renal transplanted patient. A case report.	Italy	Journal of public health	UK	Yes	Published

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First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
Mihai, C	First case of COVID-19 in a patient with multiple myeloma successfully treated with tocilizumab.	Switzerland	BMJ Annals of the Rheumatic Diseases	UK	Yes	Published
Moreira, BL	COVID-19 in a patient with systemic sclerosis treated with tocilizumab for SSc-ILD.	Brazil	Revista da Sociedade Brasileira de Medicina Tropical	Brazil	Yes	Published
Moriguchi, T	Gargle lavage as a safe and sensitive alternative to swab samples to diagnose COVID-19: a case report in Japan.	Japan	International Journal of Infectious Diseases	UK	Yes	Published
Najarian, DJ	Case Report: Walking Pneumonia in Novel Coronavirus Disease (COVID-19): Mild Symptoms with Marked Abnormalities on Chest Imaging.	USA	JAAD case reports	Netherlands	Yes	Post-print
Nakamura, K	A case of imported COVID-19 diagnosed by PCR-positive lower respiratory specimen but with PCR-negative throat swabs.	Japan	Journal of infection and chemotherapy	Japan	Yes	Published
Ning, L	Novel coronavirus in a 15-day-old neonate with clinical signs of sepsis, a case report.	China	American Journal of Transplantation	USA	Yes	Post-print
Novi, G	Dynamic change process of target genes by RT-PCR testing of SARS-Cov-2 during the course of a Coronavirus Disease 2019 patient.	Italy	Multiple sclerosis and related disorders	Netherlands	Yes	Published
Park, JY	Diagnosis and treatment of an acute severe pneumonia patient with COVID-19: Case report.	South Korea	Journal of Korean Medical Science	Korea	Yes	Published
Pongpirul, WA	COVID-19 Infection in a Patient with End-Stage Kidney Disease.	Thailand	The New England Journal of Medicine	USA	Yes	Published
Saito, M	COVID-19 in a patient with chronic lymphocytic leukaemia.	Japan	Clinical Infectious Diseases	USA	Yes	Post-print
Sedaghat, Z	Cardiac Involvement in a Patient With Coronavirus Disease 2019 (COVID-19).	Iran	Journal of clinical neuroscience	UK	Yes	Published

First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
Seminari, E	CT morphology of COVID-19: Case report and review of literature.	Italy	American Journal of Transplantation	USA	Yes	Post-print
Sharifi-Razavi, A	Mediastinal Emphysema, Giant Bulla, and Pneumothorax Developed during the Course of COVID-19 Pneumonia.	Iran	New microbes and new infections	UK	Yes	Published
Shi, B	Case report of COVID-19 in a kidney transplant recipient: Does immunosuppression alter the clinical presentation?	China	Clinical Pediatrics	USA	Yes	Published
Shi, F	Point-of-Care Lung Ultrasound findings in novel coronavirus disease-19 pneumoniae: a case report and potential applications during COVID-19 outbreak.	China	Korean Journal of Radiology	Korea	Yes	Published
Shi, H	First Pediatric Case of Coronavirus Disease 2019 in Korea.	China	Radiology	USA	Yes	Published
Silverstein, WK	CT image of novel coronavirus pneumonia: a case report.	Canada	The Lancet	UK	Yes	Published
Singh, R	SARS-CoV-2 enterocolitis with persisting to excrete the virus for approximately two weeks after recovering from diarrhea: A case report.	USA	Journal of cardiac failure	USA	Yes	Post-print
Singhania, N	Successful recovery of COVID-19 pneumonia in a renal transplant recipient with long-term immunosuppression.	USA	The American journal of medicine	USA	Yes	Pre-print
Sivakorn, C	2019 Novel Coronavirus (COVID-19) Pneumonia with Hemoptysis as the Initial Symptom: CT and Clinical Features.	Thailand	The American Journal of Tropical Medicine and Hygiene	USA	Yes	Post-print
Sun, R	A Diabetic Patient With 2019-nCoV (COVID-19) Infection Who Recovered and Was Discharged From Hospital.	China	Korean Journal of Radiology	Korea	Yes	Published
Tang, B	COVID-19 with spontaneous pneumomediastinum.	China	Kidney Medicine	Netherlands	Yes	Published

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First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
Taniguchi, H	CT Manifestations of Novel Coronavirus Pneumonia: A Case Report	Japan	Acute medicine & surgery	USA	Yes	Published
Tavazzi, G	Recurrence of positive SARS-CoV-2 RNA in COVID-19: A case report.	Italy	European Journal of Heart Failure	UK	Yes	Published
Thevarajan, I	Imaging changes in severe COVID-19 pneumonia.	Australia	Nature Medicine	USA	Yes	Published
Ullah, W	Asymptomatic novel coronavirus pneumonia patient outside Wuhan: The value of CT images in the course of the disease.	USA	JACC. Case reports	USA	Yes	Post-print
Van Cuong, L	First case of Coronavirus Disease 2019 (COVID-19) pneumonia in Taiwan.	Japan	The Lancet Infectious Diseases	UK	Yes	Published
Virani, A	2019 Novel Coronavirus (COVID-19) Pneumonia: Serial Computed Tomography Findings.	USA	IDCases	Netherlands	Yes	Published
Wei, J	The first Vietnamese case of COVID- 19 acquired from China.	China	Korean Journal of Radiology	Korea	Yes	Published
Wu, F	Pathological findings of COVID-19 associated with acute respiratory distress syndrome.	China	Nature	UK	Yes	Published
Xu, Z	Changes of CT findings in a 2019 novel coronavirus (2019-nCoV) pneumonia patient.	China	The Lancet	UK	Yes	Published
Yang, X	First imported case of 2019 novel coronavirus in Canada, presenting as mild pneumonia.	China	Clinics and Research in Hepatology and Gastroenterology	France	Yes	Published
Zeng, JH	Case of the Index Patient Who Caused Tertiary Transmission of COVID-19 Infection in Korea: the Application of Lopinavir/Ritonavir for the Treatment of COVID-19 Infected Pneumonia Monitored by Quantitative RT-PCR.	China	Infection	Germany	Yes	Post-print

First Author (Last name, First initials)	Article Title	Corresponding Author's Country	Journal	Journal Country	Article Open Access Status	Print Status
Zhan, WQ	Journey of a Thai Taxi Driver and Novel Coronavirus.	China	European Review for Medical and Pharmacological Sciences	Italy	No	Published
Zhang, W	Pre- and Posttreatment Chest CT Findings: 2019 Novel Coronavirus (2019-nCoV) Pneumonia.	China	Intensive Care Medicine	Germany	Yes	Published
Zhang, X	Evolution of CT Manifestations in a Patient Recovered from 2019 Novel Coronavirus (2019-nCoV) Pneumonia in Wuhan, China.	China	Blood Advances	USA	Yes	Published
Zhang, X	The First Case of 2019 Novel Coronavirus Pneumonia Imported into Korea from Wuhan, China: Implication for Infection Prevention and Control Measures.	China	Japanese Journal of Radiology	Japan	Yes	Published
Zhou, B	A new coronavirus associated with human respiratory disease in China.	China	Journal of thrombosis and thrombolysis	USA	Yes	Published
Zhou, C	2019 Novel Coronavirus (2019-nCoV) Pneumonia.	China	The Lancet Infectious Diseases	UK	Yes	Published
Zhu, L	First Case of 2019 Novel Coronavirus in the United States.	China	American Journal of Transplantation	USA	Yes	Published
Zhu, W	CT Imaging of the 2019 Novel Coronavirus (2019-nCoV) Pneumonia.	China	Neurosurgery	USA	Yes	Published

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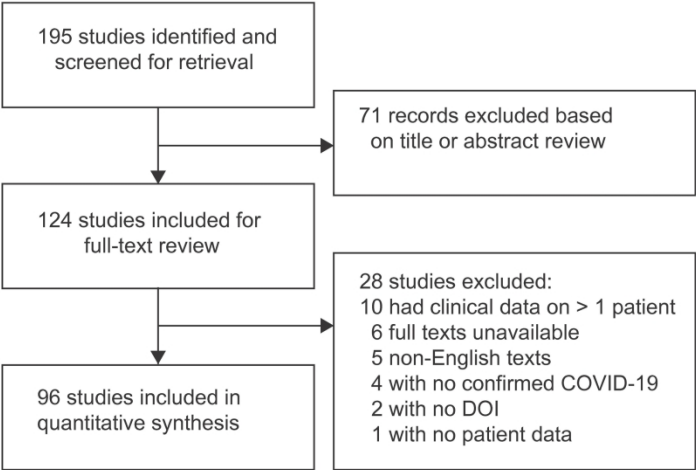


Figure 1. Search flow. COVID-19, coronavirus 2019; DOI, digital object identifier
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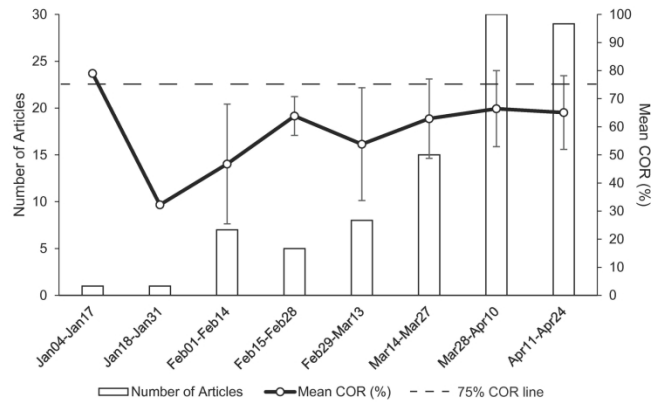


Figure 2. Number of case reports published on COVID-19 from the beginning of 2020 to the date of the search (April 24, 2020) with corresponding mean completeness of reporting (COR) scores. COR, completeness of reporting.

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