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Original Article

Examination of the Publication Quality of Abstracts of Systematic Reviews and Meta-Analyses on Measles, Published between 2009-2023 and Indexed in the PubMed Article Database

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Abstract

Background: Measles, a highly contagious, yet vaccine-preventable disease, is currently experiencing a notable resurge in numbers, in developing countries. With limited reading time, physicians often rely on structured summaries, and well-prepared abstracts can encourage them to read the full article, facilitating patient care. We aimed to examine the reporting quality of article abstracts about measles.

Methods: Indirectly/directly address measles and its vaccine, scrutinizing on systematic reviews and meta-analyses published from 2009 to the present, and indexed in the open-access PubMed article database. With the widespread use of abstract checklists like PRISMA-A in reading systematic reviews and meta-analyses, the message intended to be conveyed can be adequately delivered to the reader by abstracts only, respecting standard rules and requirements for reporting. We used a scoring system for compliance with PRISMA-A checklist in reading measles-related reviews published over the last 15 years.

Results: On average, the abstracts were "very highly" compliant with the expected reporting criteria: The year of publication (with 2020 as the timepoint) did not make any difference in reporting quality, but structured abstract were significantly more likely to convey their message in an "expected" manner, based on PRISMA-A criteria.

Conclusion: Using standard guidelines in evaluating reporting quality of different publications and emphasizing its importance for the writers and readers, alike, will be encouraging for improved presentation of original/filtered research results, with the goal of conveying valid and reliable health-related information, in a time-efficient way.

Keywords: Measles; Systematic review; Quality assessment

Introduction

Measles was first mentioned in writing by a Persian doctor in the 9th century and was later described as a contagious disease in 1757, by a Scottish doctor, Francis Home (1). The measles virus spreads through droplets from the nose, mouth, or throat of infected individuals. Initial symptoms

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typically appear 10-12 days after infection and include high fever, runny nose, red eyes, and small white spots inside the mouth. A few days later, a rash develops, starting on the face and upper neck, and gradually spreading downward. The disease is more prevalent in malnourished young children, especially in those with vitamin A deficiency or weakened immune systems due to HIV/AIDS or other illnesses. The most severe complications include blindness, encephalitis, severe diarrhea leading to dehydration, and pneumonia, a serious respiratory infection (2-4).

Measles outbreaks caused by the virus had devastating effects in isolated communities, such as the Faroe Islands (1846), Hawaii (1848), Fiji (1875), and Rotuma (1911) (2, 4). Measles was considered an endemic disease worldwide, leading to approximately 30 million cases and over 2 million deaths globally each year (3). In this regard, the measles vaccine has been a significant breakthrough in reducing the morbidity and mortality of the disease (3).

The measles vaccine has been in use since the 1960s as a safe, effective, and inexpensive method of (primary) prevention. The WHO recommends vaccinating all susceptible children and adults for whom the vaccine is not contraindicated. The WHO supports the administration of two doses of the measles vaccine to all children, either alone or in combination forms, as measles-rubella (MR), measles-mumps-rubella (MMR), or measles-mumps-rubella-varicella (MMRV) vaccines, with a 28-day interval between the 2 doses (4). Vaccination has dramatically reduced global measles deaths by 73% between 2000 and 2018, but the disease is still prevalent in many developing countries, particularly in parts of Africa and Asia. In 2018, more than 140,000 people reportedly died from measles, with 95% of these deaths occurring in countries with low per capita income or weak healthcare infrastructure (3).

In Türkiye, two doses of the MMR vaccine are administered at the ages of 1 and 4, as recommended by the Expanded Immunization Program (5); off-schedule vaccination is recommended for high-risk regions and encouraged for babies aged 9-11 months (6).

Systematic reviews and meta-analyses are largely considered as the best information source for physicians pursuing time-efficient evidence retrieval. Such studies present original research findings in a systematic, thoroughly synthesized manner, with emphasis of effect modifiers (if any) and are positioned at the top of the evidence pyramid. Reviews offer a quick catch up with novel findings and/or changes in information, rather than reading individual articles one by one. From a methodological perspective, a systematic review should provide a well-established summary that allows for assessment of the review's content and the applicability of the findings to the readers' patient populations. Easy and free access to abstracts in many electronic data bases augments referral to abstracts rather than whole texts.

The PRISMA-A (PRISMA Abstract) Checklist offers authors a detailed framework for preparing an abstract to their systematic review, to fulfill the expectations of the readers regarding the rationale, aims, hypotheses, methodology, findings and conclusion of the review presented (7). Despite the scarcity of medical articles using PRISMA-A, there are some exemplary studies on its usefulness (8, 9).

Despite the widespread availability of an effective vaccine, measles remains a major global public health challenge. To date, no systematic review has assessed the reporting quality of measles vaccine abstracts using the PRISMA-A checklist, and this study aims to fill that gap. We systematically retrieved all measles-related systematic reviews and meta-analyses published in PubMed between 2009 and 2023 and evaluated the adequacy of their abstracts according to PRISMA-A criteria. Our analysis focused on the extent to which abstracts alone provide readers with up-to-date, valid, and reliable information regarding the study topic and findings, and on identifying ways to enhance reporting quality in line with PRISMA-A recommendations. The evaluation of the methodological rigor of the reviews and the validity of their findings was beyond the scope of this work.

Methods

The research analyzed all systematic reviews and meta-analyses published in English language between 2009 and 2023, which were cited in the widely accessible and commonly used PubMed database. Retrieval of the articles were established using the terms '(measles) AND (systematic review)' and '(measles) AND (meta-analysis)'. In the case of duplicate articles, they were counted as a single (only one) article. The starting date for included publications was set to 2009, when the PRISMA Checklist was first published (10). A specific checklist, namely 'PRISMA 2020 for Abstracts Checklist (PRISMA-A)' was introduced to medical professionals in 2020 to evaluate the quality of the reporting criteria of the articles' abstracts, only (11). The researchers calibrated their evaluations of reporting items through joint meetings and developed a standardized scoring table, which is provided in detail in the appendix (Appendix-1- Not published). Year 2020 was used in our study as a reference time cut-off in comparing reporting quality of the abstracts, before and after the availability of PRISMA-A for medical writers' use. A list of the reviewed articles is included as an attachment in .xlsx format (Appendix-2). The characteristics of the articles listed on PubMed but excluded from our research are presented in a flowchart (Fig. 1).

In scoring, PRISMA-A checklist recommendations are checked for presence in a selected article abstract and either 0 (absent) or 1 (present) is given to each recommendation (Appendix-2). The highest possible score a reviewed article could receive was 12. Although articles published in the Cochrane Review System use the term "review" instead of "systematic review," full (1) point was awarded for the term review rather than systematic review in the "title" for Cochrane articles, given that Cochran Collaboration is exclusively a publisher of systematic reviews and meta-analyses.

In addition to subgroup analysis based on the updated PRISMA-A was not conducted, as it would not have yielded statistically meaningful results.

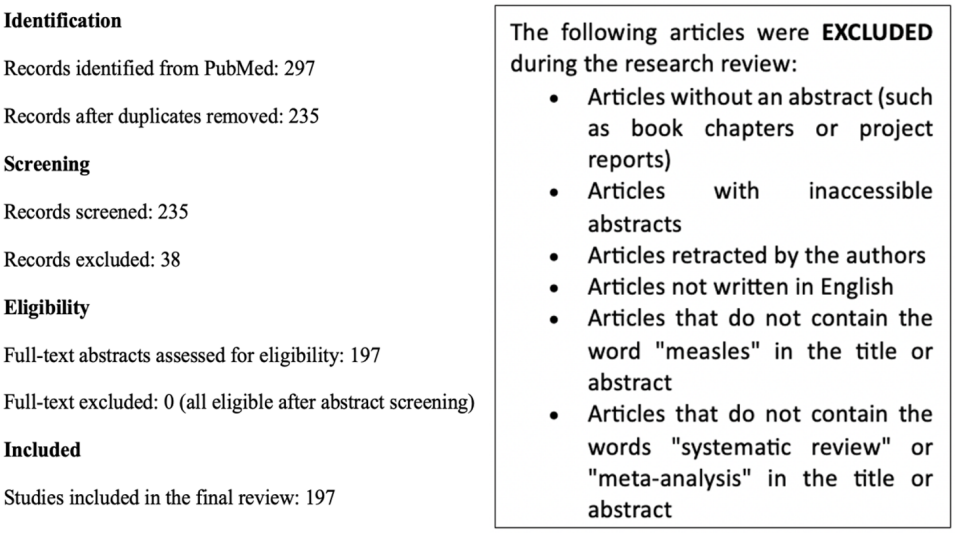

Fig. 1: Flow Chart (PRISMA 2020 Flow Diagram (adapted))

For data analysis, IBM SPSS ver. 29.0 (IBM Corp., Armonk, NY, USA) was used. Descriptive statistics were presented as numbers and percentages, while distribution statistics were reported as mean, standard deviation, median, minimum-maximum values, and 1st and 3rd quartiles. The normal distribution of continuous variables was checked using the Kolmogorov-Smirnov and

Shapiro-Wilk tests. Since the total score did not conform to normal distribution, it was analyzed using the Mann-Whitney U and Kruskal-Wallis tests, while categorical variables were analyzed using the Pearson Chi-square test. Based on the quartile division of the obtained scores a total article score of 6.0 or below was categorized as 'Low'; while total quality scores corresponding to 6.1-7.0, 7.1-8.0, and 8.1/above were categorized as 'Medium', "High" and 'Very High' reporting quality. Type 1 error was set as 0.05 in all analyses.

Results

A total of 235 article abstracts were thoroughly examined, while 197 eligible articles were included in analyses. Of the articles reviewed, 73.6% (n=145) exhibited the characteristics of systematic reviews but did not conduct a meta-analysis. The articles were most frequently authored by four researchers (17.3%, n=34). The most common mention of measles in the articles was related to vaccination (57.9%, n=114), and measles was referenced indirectly in 63.5% of the articles (n=125). The abstract section was structured in 70.6% of the articles (n=139) (Table 1).

Table 1: Basic characteristics of the articles included in the study

Characteristics	Number (n)	Percentage (%)
Article Research/Analysis Type		
Systematic Review	145	73.6
Meta-Analysis	52	26.4
Number of Authors		
1-5	107	54.3
6-10	68	34.5
11-15	16	8.2
16-20	5	2.5
31	1	0.5
Type of Mention of Measles		
Vaccine	114	57.9
Disease/Infection	80	40.6
Disease and vaccine together	3	1.5
Mention of Measles in Article		
Direct	72	36.5
Indirect	125	63.5
Type of abstract		
Structured	139	70.6
Unstructured	58	29.4
Total	197	100.0

*The articles reviewed have been grouped according to the characteristics of how measles is mentioned in the text

Of the articles studied 54.8% (n=108) were published before 2020, with the highest count in 2022 (13.2%) (Table 2). The articles included in the study had an average reporting score of 7.0 ± 1.5 out of a maximum 12.0, with a median score of 7.0. The lowest scores were obtained for reposting the risk of bias or limitation(s) of the evidence (Table 3).

Table 2: Distribution of publication years of the articles included in the study

Publication Year	Number (n)	Percentage (%)
2009	5	2.5
2010	5	2.5
2011	9	4.6
2012	3	1.5
2013	9	4.6
2014	8	4.1
2015	9	4.6
2016	20	10.2
2017	19	9.6
2018	7	3.6
2019	14	7.1
2020	24	12.2
2021	17	8.6
2022	26	13.2
2023	22	11.2
Total	197	100.0

In the study, the average score for compliance with the expected criteria in the methods section of the reviewed articles was 2.0 ± 1.0 out of a maximum score of 4, with a median of 2.0. In the findings section, the average score was 1.9 ± 0.3, with a median of 2.0 (Table 3).

Table 3: Scoring characteristics of articles included in the research by headings and sections

Characteristics (n=197)	Mean±SD	Median	Min-Max	1st-3rd Quarters
Headings				
Title	0.8±0.4	1.0	0.0-1.0	1.0-1.0
Objectives	1.0±0.0	1.0	1.0-1.0	1.0-1.0
Eligibility Criteria	0.6±0.4	1.0	0.0-1.0	0.0-1.0
Information Sources	0.5±0.4	1.0	0.0-1.0	0.0-1.0
Risk of Bias	0.2±0.4	0.0	0.0-1.0	0.0-0.5
Synthesis of Results-Y	0.5±0.5	1.0	0.0-1.0	0.0-1.0
Included Studies	0.9±0.2	1.0	0.0-1.0	1.0-1.0
Synthesis of Results-S	0.9±0.1	1.0	0.0-1.0	1.0-1.0
Limitation of Evidence	0.2±0.4	0.0	0.0-1.0	0.0-0.0
Interpretation	1.0±0.1	1.0	0.0-1.0	1.0-1.0
Funding	0.1±0.2	0.0	0.0-1.0	0.0-0.0
Registration	0.1±0.3	0.0	0.0-1.0	0.0-0.0
Sections				
Title	0.8±0.4	1.0	0.0-1.0	1.0-1.0
Background	1.0±0.0	1.0	1.0-1.0	1.0-1.0
Methods	2.0±1.0	2.0	0.0-4.0	1.0-3.0
Results	1.9±0.3	2.0	0.0-2.0	2.0-2.0
Discussion	1.2±0.4	1.0	0.0-2.0	1.0-1.0
Other**	0.1±0.3	0.0	0.0-2.0	0.0-0.0
Total Points	7.0±1.5	7.0	3.0-11.0	6.0-8.0

*SD: Standard Deviation, Min-Max: Minimum-Maximum

**The "Other" section consists of the headings: Budget Support and Registration Status

Based on quality scores obtained from compliance with PRISMA-A recommendations, the average score of the articles in the 'Very High' group is 9.2 ± 0.7, with a median of 9.0. That is, the top 25% of all examined abstracts got an average reporting score of 75% of what was recommended by PRISMA-A; no abstract fulfill all recommendations.

No statistically significant difference was observed across reporting quality scores across time, taking 2020 (the year of introduction of PRISMA-A) as the cut point (P=0.160)

We obtained a statistically significant difference in reporting quality scores of the abstracts, favoring higher scores of the structured abstracts (P=0.009, Table 4).

Table 4: Quality status of articles included in the study according to abstract structure

	Reporting Quality Group, n (%)					
Type of Abstract	Low	Medium	High	Very High	Total	*P* value*
Structured	30 (21.6)	42 (30.2)	38 (27.3)	29 (20.9)	139 (100.0)	0.009*
Unstructured	26 (44.8)	13 (22.4)	13 (22.4)	6 (10.3)	58 (100.0)	
Total	56 (28.4)	55 (27.9)	51 (25.9)	35 (17.8)	197 (100.0)	

*Pearson Chi-square test

Discussion

Measles is still a significant public health issue in Türkiye and around the world due to factors such as the increasing number of high-risk populations, migrant movements, natural disasters, and war situations, as well as the relative decline in vaccination rates, with growing vaccine hesitancy rates (12). Therefore, there remains a continued need for physicians to have up-to-date information on this topic. Published systematic reviews and meta-analyses stand out as the fastest and easiest way to access current and filtered information (13). Easy and fast access to full text articles through electronic data bases, freely through open access online journals and/or institutional libraries is a growing chance for many. Yet, many physicians have time constraints. leading them to eye scrolling through abstracts, rather than reading the full-text, unless they find it necessary. That is, the reporting quality of the abstracts have become as important as that of the full text. This urged us to study how good the reporting of the abstract of measles-related systematic reviews and meta-analyses are, in order to establish areas of potential improvement, if needed (8).

For many years, journal editors and reviewers have been using various reporting criteria for a standardized approach when writing/critically appraising medical manuscripts Junior researchers, in particular, would benefit from reporting guidelines/checklists conveying their research findings to the readers of interest. In addition to the widely used PRISMA checklist for determining the quality of compliance with reporting criteria of systematic reviews and meta-analyses, another, namely PRISMA-A was introduced in 2009 to medical professionals to assess the methodological adequacy of the abstract sections of reviews (14, 15). In this study, the PRISMA-A checklist was utilized to evaluate the reporting quality of the abstracts of the eligible articles. While the checklists examine its individual recommendations in a manuscript as "present/absent", we developed a "reporting quality score" assessment specific to each article by assigning a point for each subheading (as, 1 if met; 0 if absent) to enable cross comparisons across articles abstracts. The term "quality" should be restricted to reporting only and evaluation of the intrinsic and extrinsic validity of the individual study findings is beyond our scope. Simply, our question was “how good is the abstract to present the reader the objectives, methodology, find-

ings and conclusion of the review established?" The better the reporting, the easier and more accurately the reader can understand the article and can effectively convey its findings to the appropriate patient group(s). While this study primarily highlights the differences and deficiencies in reporting of measles-related articles' abstract, we would like to motivate the readers to use similar checklists in evaluating reporting of other medical topics. This approach will eventually improve the reporting quality of medical papers, with long-term use of relevant findings in evidence-based medical practice and/or policy making.

To the best of our knowledge, no comparable study focusing on the reporting quality of measles-related abstracts has been reported in the existing literature. A detailed evaluation of our findings yielded several key discussion points and conclusions, which are presented below.

In this study, the abstract sections of a total of 197 articles published since 2009 that mention measles (either directly or indirectly) and are available in PubMed were evaluated. The majority of the articles are systematic reviews. Most of the articles had 1-5 (co)authors and only 6 articles had 16 or more authors. In more than half of the studies, measles is discussed under the topic of 'vaccination.', including vaccine-effectiveness, vaccine recommendations by age group, suggestions for patients with autoimmune diseases, vaccination of high-risk groups, and comparisons between MMR and MMRV. Regarding articles directly on measles, various topics have been explored, including the effect of vitamin A on disease and mortality, the impact of various plants on measles, and/or complications of measles. This article is restricted to the methodological evaluation process of reporting, only, and our content assessments are excluded from this article.

In almost two-third of the articles evaluated, measles disease/vaccine was indirectly mentioned in the manuscript; i.e., measles was not the only topic of the manuscript. Nearly half of the published articles related to measles have been published in 2020 or later. Increase in number of articles over time may be attributed to the increased focus on infectious diseases, like COVID-19, over time or due to developments regarding new vaccines and/or the relative increase in the measles mortality in conflict zones, areas of limited health care access, or poor socio-economic status. The examination of the effects of the measles vaccine on COVID-19, the transmission types and durations of diseases, and perspectives on vaccine acceptance and refusal following the COVID-19 pandemic might have contributed to a relative increase in both direct and indirect research on measles. Lastly but not the least, the overall increase in the number of medical manuscripts over time, with increased visibility and access through open access articles might explain the increased number of measles-related systematic reviews/meta-analyses over time.

Out of a total possible reporting score of 12, the lowest total score obtained in the study was 3.0 and the highest score was 11.0. Most of the articles received full points for the reporting of sections such as objectives, interpretation, inclusion criteria, and discussion of results. However, the majority of articles had low scores for the sections on "registration of the study in a database," "funding," "limitations," and "bias characteristics/issues". This might raise concerns about the epidemiology knowledge of the authors/reviewers, if a similar defect is detected in the manuscript texts, as well. A further study on this issue will be valuable.

Our expectation that quality of the abstracts reporting would increase after the introduction of PRISMA-A to medical professionals and/or epidemiologic knowledge of the authors and more frequent use of reporting checklists by authors/reviewers would increase as years pass was not met. This finding in measles-related research may or may not be confirmed with other medical topics, though. Availability of reporting checklists and/or guidelines do not necessarily ensure their use by authors/reviewers. In future studies with authors and/or editorial boards, this issue may be studied in depth through qualitative studies.

Our finding of a statistically significant association between reporting quality of the abstract and

the format of the abstract (i.e. structured versus unstructured) is noteworthy. It is possible that the structured format of the abstract might have motivated authors to care for subheadings. However, it is also likely that the journals requesting a structured abstract format are more tedious on methodologic quality of the manuscripts sent for a potential publication and the abstracts (possibly main texts, also) are being revised more carefully during the publication process. This latter hypothesis that the journals that require structured abstracts being more stringent in their reporting criteria and emphasizing this request during peer review warrants further research. Our personal publication experience reveals that many factors constrain authors in preparing the abstract section of the articles: The maximum word count permitted by journals for abstracts, expectations for specific formats (such as structured or unstructured abstracts), and restrictions on including certain sub-headings (e.g., bias or sources of error) can lead to abstracts failing to meet the expected set of reporting criteria. Often researchers determine the usability and relevance of the articles they encounter in literature searches by the title and abstract alone. Therefore, it is essential that the title and abstract section of manuscripts to provide the 'key information' to the reader (7). This information emphasizes the importance of using checklists like PRISMA and PRISMA-A in writing articles of research, particularly in systematic reviews and meta-analyses, which appear to be the most time-efficient means of learning by many physicians.

There are earlier studies related to measles, which were written using the PRISMA checklist, and or reportedly evaluated using this checklist (13, 16-18). However, the use of the PRISMA-A checklist is quite limited in published articled. Promoting adoption of PRISMA_A checklist by authors/reviewers would be valuable and increasing awareness among young authors will have the potential to improve the methodologic quality of the upcoming publications.

Strengths

To our knowledge, this is the first study conducted reporting criteria of medical reviews, using the keyword "measles." Similarly, there are very limited examples in the literature regarding use of PRISMA-A checklist. This study serves as a pioneer work emphasizing importance of a standardized reporting method for abstracts of published articles, beyond the intrinsic methodological quality of the scientific work presented.

Limitations

The research was conducted solely by examining articles written in English on measles over the last 15 years and cited in the PubMed database. PubMed provides comprehensive coverage of biomedical journals; however, it does not encompass the entire literature. Future studies may include additional databases. Evaluations of the abstracts were completed by one epidemiologist (SAK), which might increase standardization, yet, potential biases due to single evaluator cannot ensure inter-rater comparability.

Conclusion

As a result, there is a broad literature pool presenting a highly credible systematic review and meta-analyses on measles. Reporting quality of the abstracts of such work seem to be crucial to effectively convey the intended message to the potential users (physicians, extending through patients) and to facilitate the dissemination of accurate information in an efficient and reliable manner. The use of standardized checklists for both full texts and abstracts in such studies will enable the sought-after information to reach the reader in a clearer and more understandable way. This will ensure that comprehensible and accessible evidence-based content is delivered to researchers by the author(s). Besides the manuscript preparation period, use of reporting checklists is valuable for peer review, and critical reading processes, as well. With this paper focusing on measles, we hope to motivate the readers to conduct similar research on any other medical

topic of interest to emphasize the benefits of standardization of reporting of medical studies.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interests

The authors declare no competing interests.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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