



# Insights into Radiology Publications

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## Abstract

The evolution of modern medicine has been significantly driven by medical and health care research, underscoring the importance of disseminating findings to advance health care. Medical literature, encompassing various publication types such as case reports, review articles, and original research, plays a crucial role in this process by facilitating the communication and discussion of new discoveries. This review article provides a comprehensive guide to understanding and navigating radiologic publications. It examines the various types of radiologic research articles, including case reports and series, pictorial reviews, original research, systematic reviews, and meta-analyses, each of which serve distinct purposes in contributing to the field of radiology. The study adopts the “six honest men” approach—addressing why, who, what, when, where, and how—to elucidate the essential elements of successful radiology research and publication. Key topics include the motivations for publishing, the types of articles suited for different research questions, and strategic considerations for selecting appropriate journals. Additionally, the review highlights the importance of understanding publication timing, journal selection criteria, and the overall publication process, including manuscript preparation and peer review. By offering these insights, the review aims to equip early-career researchers with the knowledge and skills necessary to effectively contribute to radiology literature and advance their academic and professional careers.

## Keywords

- case report
- case series
- manuscript
- meta-analysis
- original article
- pictorial review
- publications
- radiology
- review article
- systematic review

## Introduction

Over the decades, medicine has seen remarkable advancements, many of which have been driven by rigorous research and the systematic dissemination of findings. Medical or health care research plays a critical role in the synthesis and expansion of knowledge about human diseases, ultimately guiding the prevention and treatment of illnesses and promoting overall health.<sup>1</sup> This continuous

cycle of discovery, testing, and implementation has led to countless breakthroughs, both monumental and incremental, that have shaped modern medicine. The role of medical literature in this process cannot be overstated, as it serves as the primary vehicle for sharing new insights with the broader medical community. Through various publication types—such as case reports and series, review articles, original research articles, systematic reviews, and meta-analyses—research findings are communicated, debated,

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and built upon, fostering an environment of constant learning and improvement.

Advances in radiology have been fueled by radiology research, which are categorized under the same types. Each type of article serves a distinct purpose, contributing uniquely to the body of knowledge in radiology. Case reports, case series, and review articles, for example, are primarily descriptive, offering detailed accounts of one or more specific cases or exploring topics of academic interest. These articles often place emphasis on radiologic images, which are crucial for illustrating the underlying themes and findings. Radiologic review articles frequently take the form of pictorial reviews. These reviews stand out by featuring thematically curated radiographic, ultrasonographic, computed tomography (CT), magnetic resonance imaging (MRI), and nuclear scintigraphy images. These visual elements serve as the foundation for textual discussions, providing concrete examples to enhance the reader's understanding of the issues at hand.<sup>2</sup>

Conversely, original research articles, systematic reviews, and meta-analyses in radiology lean heavily on the experimental side of research. These types of publications prioritize study methodology, rigorous analysis, and the interpretation of results, often presenting findings that have broader implications for clinical practice. For early-career researchers aiming for successful publication, it is crucial to understand these different types of radiological articles, their specific purposes, and the nuances involved in appropriately presenting their manuscripts. Mastery of these aspects not only facilitates the dissemination of their findings but also ensures that their work can contribute meaningfully to the ongoing dialog in radiology.

In this review article, we aim to provide a comprehensive guide to the basics of radiologic publication. Adopting the “six honest men” approach—why, who, what, when, where, and how—we will explore the key elements that underpin successful radiology research and publication. Additionally, in the last section titled “Basic Structure of Scientific Papers,” we will delve into how each type of research article can be structured, offering the reader a general understanding of what these entail and how they fit into the broader context of radiology literature. This manuscript is designed to equip readers, particularly those at the beginning of their research careers, with the insights and knowledge needed to navigate the complex landscape of radiology publications effectively.

## Basics of Radiologic Publications

### Why to Publish?

Publishing is a cornerstone of scientific research, serving as a permanent record of the work undertaken and the knowledge gained. The primary aim of medical publication is to disseminate this knowledge to the broader scientific community. By sharing research findings, authors contribute to a collective understanding that can be accessed, discussed, and, ideally, accepted by peers. This process of dissemination not only advances the field but also invites critical evaluation,

which is essential for refining theories, improving methodologies, and ultimately enhancing patient care.

Moreover, publication in peer-reviewed journals offers several tangible benefits to the individual, the department, and the institution beyond the intrinsic value of contributing to medical knowledge.<sup>3</sup> For individual researchers, publishing is a vital step in advancing their career goals. It strengthens their academic and professional profiles, making them more competitive for prestigious positions, career promotions, and other opportunities within the field. The process of conducting literature reviews, preparing manuscripts, and engaging with peer feedback also deepens the researcher's expertise in their area of study. Over time, this expertise can lead to recognition as a thought leader among peers, opening doors to invitations to lecture at scientific meetings, collaborate on international projects, and teach at esteemed institutions around the world.

For the department and institution associated with the research, successful publication can enhance their reputation and attract talent. Recognition in the scientific community can lead to successful research grants and funding, which are crucial for sustaining and expanding research programs. As an institution gains a reputation for excellence in radiology research, it becomes a magnet for top talent, further research collaborations, and patients seeking cutting-edge care. This virtuous cycle not only elevates the institution's standing but also contributes to the overall advancement of the field, reinforcing the importance of publishing as a key component of scientific and medical progress.

### Who Should Publish?

While the journey into radiological research often begins during radiology residency, the opportunity to engage in research should ideally begin much earlier. In fact, research can serve as an invaluable gateway for medical aspirants and medical students who are considering radiology as a future career. Early involvement in research and subsequent publication in radiological journals not only allows trainees to develop skills in critical thinking and methodology but also creates a spark of enthusiasm and passion by providing a platform to contribute to the field even at the outset of their medical careers.

For trainees with limited research experience, collaboration is key. Aligning with experienced mentors and collaborators who have a strong track record of publications can provide invaluable guidance, helping navigate the often-complex process of conducting research and preparing a manuscript for publication. Such partnerships not only enhance the quality of the research but also offer opportunities for learning and professional growth. While it is crucial to encourage and support young researchers, the contributions of experienced professionals remain invaluable, as their extensive expertise often leads to innovative research, high-impact publications, and the development of authoritative guidelines that shape the future of the field.

This review is particularly aimed at those seeking to take their first steps into radiologic research, including medical

students, radiology residents, and radiologists. By understanding the significance of publishing and how to approach it effectively, these individuals can better position themselves for success in their careers and contribute meaningfully to the advancement of radiology. Whether driven by a desire to explore radiology as a specialty, enhance career prospects, or simply share new insights with the medical community, the journey of publishing in radiology is one that offers rich rewards for those who undertake it.

### What to Publish?

In an ideal research scenario, a radiologist begins by identifying a specific topic of interest within the field of radiology. This process starts with an extensive review of the literature, which forms the foundation for a thorough understanding of the topic and can lead to the preparation of a review article. If supplemented with an adequate collection of locally acquired radiologic images, such a review can be transformed into a pictorial review.

An extension of this process is identifying gaps in literature areas, where questions remain unanswered or where further exploration is needed. These gaps can be formulated into a specific research question, which can then be addressed through various study designs, including cross-sectional studies, case-control studies, cohort studies, or randomized controlled trials. The choice of methodology depends on the specific research question, available resources, and feasibility. The results of these studies are analyzed statistically, often in collaboration with statisticians or epidemiologists, and are presented as an original research manuscript.

Another approach to addressing a research question is through systematic reviews and meta-analyses. These methods involve combining and analyzing data from multiple previous original research studies on the same topic, providing a comprehensive overview and synthesis of existing research.<sup>4</sup> Original research articles, systematic reviews, and meta-analyses are integral parts of “evidence-based medicine,” which encompasses collecting and examining research evidence to improve clinical decisions. Research data contribute to different levels of evidence, categorized in a hierarchical order based on the strength of the experimental design.<sup>5</sup> At the top of this hierarchy is level 1 evidence, which is considered the strongest and includes systematic reviews and meta-analyses of well-designed and well-conducted studies, particularly randomized controlled trials. These high levels of evidence play a crucial role in guiding clinical practices and policies. ►**Fig. 1** demonstrates the different levels of evidence presented as a pyramid.

For early-career researchers or those with limited access to extensive research resources, case reports and case series offer a more accessible entry point into research. These simpler forms of research still contribute valuable knowledge, especially when they highlight rare conditions or novel findings.

Other opportunities to publish in the form of short communication include “technical notes” regarding a specific technique or procedure and “letters to the editor,” which

are usually brief and objective comments on previously published articles.<sup>6</sup>

### When to Publish?

Early initiation into research and publication sets a strong foundation for a successful academic career. However, research endeavors can begin at any stage of one's professional journey. The timing of publication can also be influenced by local and global events that impact the medical community. For instance, during and immediately following the COVID-19 pandemic, there was a notable surge in publications related to the virus, while research on other topics saw a temporary decline. This shift was driven by a combination of factors, including the urgent need for COVID-19-related information and the reallocation of resources.<sup>7</sup> Researchers aiming to publish their work must be mindful of such globally significant events and trends, as they can affect the visibility and relevance of their research. Strategic timing, aligned with current events or emerging trends, can increase the chances of successful publication and ensure that the research makes a timely impact.

### Where to Publish?

The selection of a target journal for publication is a critical decision that can happen during the course of the study or alternatively during or after manuscript preparation. The choice of a target journal is guided by many factors including the intended audience, the scope of the research, and the researcher's career goals. Among the many metrics used to gauge the different journals, one of the commonly used metrics is the “impact factor,” which is published yearly in the Journal Citation Reports, the latest being 2023 Journal Impact Factor, *Journal Citation Reports* (Clarivate 2024). Higher impact factor implies higher citations, which often indicate a broader reach and higher visibility making them attractive options for researchers seeking to maximize the influence of their work. For instance, well-established journals such as *Radiology*, *American Journal of Roentgenology*, *European Radiology*, and *Clinical Imaging* accept manuscripts covering a broad range of topics within radiology including clinical practice, research, and education. These journals are ideal for researchers whose work addresses broad or general issues in radiology. On the other hand, more specialized journals such as the *Journal of Ultrasound in Medicine* and the *Journal of Magnetic Resonance Imaging* focus on research related to specific modalities, techniques, and applications. Subspecialty journals like *Neuroradiology*, *Journal of Pediatric Radiology*, *Journal of Vascular and Interventional Radiology*, *Abdominal Radiology*, and *Journal of Thoracic Imaging* cater to research within their respective fields, offering a more targeted audience.

National journals like the *Indian Journal of Radiology and Imaging* provide a platform for research that addresses region-specific issues and offers national exposure, which can be prestigious. Publishing in such journals allows researchers to contribute to the advancement of radiology within their own country, addressing local challenges and

influencing national health care practices. This can be particularly impactful for researchers aiming to make a difference in their local communities while gaining recognition in the national academic landscape.

To determine the best fit for their research, authors should explore each journal's Web site, review the journal's scope and submission guidelines, and examine recent articles to understand the type of content the journal typically publishes. This careful selection process helps ensure that the research is aligned with the journal's mission and audience, increasing the likelihood of acceptance and making a meaningful contribution to the field.

### How to Publish?

Publishing a radiology article is a multifaceted process that begins long before the manuscript is submitted and involves careful planning, rigorous research, and strategic decision-making. The journey starts with identifying a compelling radiological case study or research question, which should be informed by a thorough review of the existing literature. It is crucial to select a topic that aligns with current trends and interests in the field, as this increases the relevance and impact of the research.

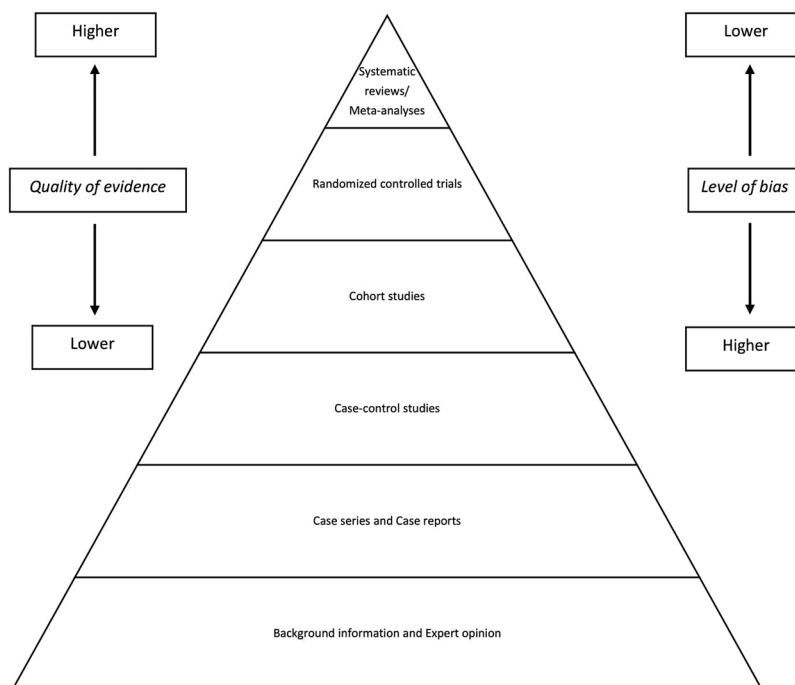
Once the topic is chosen, the next step is to design the study and outline the methodology. This involves selecting the appropriate study design, whether it be a case report, cross-sectional study, cohort study, or another type of research. Data collection must be conducted meticulously, adhering to both general and local ethical guidelines, and obtaining approval from relevant research bodies. If the study involves human subjects, obtaining informed consent may be required to ensure ethical compliance and is guided by local research ethics boards.

After data collection, the information is systematically tabulated and analyzed, often using statistical tests to determine significance. This is followed by manuscript preparation, which is typically structured into sections such as a title, an abstract, introduction, materials and methods, results, discussion, and conclusion. The references section should be carefully compiled, citing all sources of the reviewed literature to provide a solid foundation for the research.

Before submitting the manuscript, it is essential to format it according to the target journal's specific guidelines by reading the "instructions to authors" that is usually available on the Web sites of all journals. This often involves submitting the manuscript online, accompanied by a cover letter to the editor that highlights the significance of the research and its relevance to the journal's audience. Submission initiates the peer review process, where the manuscript is evaluated by the editor and selected reviewers. Their feedback is crucial, as it often includes suggestions for revisions that can strengthen the manuscript.

If the article is accepted for publication, authors may be required to make further revisions based on the feedback received. Once these revisions are completed and the final manuscript is proofread, the editor will convey the final decision on whether the article is accepted, requires additional revisions, or is rejected. It is also important to be aware of any publication fees or charges for features such as color images, as these financial obligations vary between journals and must be understood before submission.

After the article is published, promoting the work is an important step to ensure it reaches a wide audience. Authors can share their article with colleagues, utilize professional networks, and engage in promotion through social media



**Fig. 1** Levels of evidence pyramid provides a method to visualize quality of evidence from research for clinical application. Quality of evidence increases as one moves up the pyramid, while the level of bias decreases.

platforms. Additionally, presenting the research at conferences can further enhance visibility and impact, contributing to the author's professional reputation and the advancement of the field.

## Basic Structure of Scientific Papers

The basic structure of all scientific papers ranging from case reports to meta-analyses generally follows a standardized format encapsulated by the acronym IMRAD,<sup>6</sup> which stands for Introduction, Methods, Results, and Discussion. This format provides a clear and logical framework for presenting research findings and is adaptable across various types of radiological publications. While different types of manuscripts may emphasize certain sections over others, the IMRAD structure ensures consistency and clarity in scientific communication. For example, case reports and series primarily focus on case presentation, discussion, and example images, while original articles, systematic reviews, and meta-analyses are usually centered around methodology, results, and statistical analysis.

The following section describes the various types of radiological articles and the specifics involved in preparing manuscripts for each type.

## Case Report

A case report in radiology is a detailed account of a single case with unique or rare features that contribute to the understanding of a medical condition, imaging technique, or diagnostic challenge. Some examples of case reports are as follows.<sup>8,9</sup>

Writing a compelling case report involves several key steps:

### 1. Select an interesting and relevant case:

**Uniqueness:** A case that is unusual, rare, or presents an interesting diagnostic or therapeutic challenge may be chosen.

**Learning value:** The case should have significant educational value and offer insights or lessons for other clinicians and radiologists.

### 2. Gather and organize information:

**Patient information:** Relevant patient demographics (age, sex, medical history, etc.) are documented while maintaining patient confidentiality.

**Clinical history:** Detailed information about the patient's symptoms, medical history, and previous treatments are collected.

**Imaging studies:** All relevant imaging studies, including X-rays, computed tomography (CT) scans, magnetic resonance imaging (MRI), or ultrasounds are gathered. It is important to ensure images are of high quality.

### 3. Structure the manuscript:

**Title:** It should be clear and specific. It should succinctly describe the case and highlight its unique aspects. This is presented as "rare presentation of [condition] in

[age group] with [imaging finding]." For example, "Giant-cell tumor of the patella in a skeletally immature girl."<sup>10</sup>

**Abstract:** Include a concise summary of the case, including the clinical problem, key findings, and the significance of the case.

**Introduction:** It should provide the context of the case including background information on the condition or diagnostic challenge being presented. It should also explain why this particular case is noteworthy and relevant to the field of radiology.

**Case presentation:** It should present patient information such as demographic details (age, sex) without revealing personally identifiable information. This is followed by clinical history detailing the patient's symptoms, medical history, and any previous interventions or treatments. Imaging studies should be presented with detailed descriptions of the findings.

**Images/illustrations:** Annotated images should be used to highlight key features. Alternative differential diagnoses should be discussed with an explanation of how the final diagnosis was reached.

**Discussion:** It should include interpretation of the imaging findings and their relevance to the clinical condition. The author should discuss how the case fits into the existing literature or challenges current understanding. An attempt should be made to compare and contrast the case with similar cases reported in the literature while highlighting any novel aspects of the case in discussion.

**Conclusion:** It should summarize the key takeaways from the case and discuss the broader implications for radiologists and other health care providers. It should further emphasize on the educational value of the case including any implications for clinical practice or future research.

**References:** It should include a list of all sources cited in the case report, following the citation style of the target journal.

## Case Series

Writing a case series in radiology involves presenting a collection of related cases that share similar features or findings. The number of cases presented can vary but is usually less than 10.<sup>11</sup> A case series can be considered a descriptive study that can provide valuable insights into the frequency, characteristics, and management of specific conditions, and can highlight patterns or trends observed in the data.

### 1. Define the scope and objectives:

**Select cases:** A series of cases that are linked by a common feature are chosen, such as a specific condition, imaging modality, or diagnostic challenge.

**Determine objectives:** The aims of writing the case series should be identified, such as highlighting unique imaging findings, discussing variations in presentation,

or demonstrating the effectiveness of a particular diagnostic approach.

## 2. Collect and organize data:

**Patient information and imaging studies:** All pertinent anonymized patient data and imaging studies are collected for each case.

## 3. Structure the manuscript:

**Title:** It should clearly reflect the content and purpose of the case series. This is presented as "Case Series of [condition]: A Review of [number] Cases with [key finding]." For example, "Imaging Features of Acute Encephalopathy in Patients with COVID-19: A Case Series."<sup>12</sup>

**Abstract:** It should concisely summarize the case series, including the background, methods, key findings, and conclusions.

**Introduction:** It should introduce the condition or issue addressed by the case series and explain its significance in radiology and why the case series is important.

## Methods

**Case selection:** It should describe the criteria for selecting the cases included in the series and explain how cases were identified and any inclusion or exclusion criteria used.

**Data collection:** Detail the process for collecting clinical and imaging data. Include any standard procedures followed for imaging and analysis.

**Statistical analysis:** If applicable, describe any statistical methods used to analyze the data, including how findings were compared or summarized.

## Case descriptions

**Individual cases:** Present each case systematically. For each case, include the following:

- **Patient demographics:** Age, sex, and relevant clinical history.
- **Clinical presentation:** Symptoms and any pertinent background information.
- **Imaging findings:** Detailed description of the imaging studies, including key features, and any relevant images.
- **Diagnosis and management:** Report the diagnosis and any treatment or management strategies used.

## Results

**Summary of findings:** Provide a summary of key findings across all cases, highlighting commonalities, variations, or trends.

**Tables/figures:** Use tables, charts, or figures to present data clearly and effectively. Summarize quantitative findings if applicable.

## Discussion

**Interpretation:** Analyze the findings of the case series and discuss their implications. Compare the findings with existing literature and identify any new insights.

**Clinical relevance:** Explain the significance of the findings for clinical practice, including any implications for diagnosis or treatment.

**Limitations:** Discuss any limitations of the case series, such as sample size, selection bias, or variability in imaging techniques.

## Conclusion

**Summary:** Recap the main findings and their implications.

**Recommendations:** Offer recommendations for clinical practice or suggestions for future research based on the findings.

**References:** Include a comprehensive list of references cited in the case series, following the citation style of the target journal.

## Review Article/Pictorial Review

Writing a review article in radiology involves reviewing existing research and presenting a comprehensive overview of a particular topic and aimed at providing the reader with a broad understanding. A pictorial review is a type of academic review article in radiology that emphasizes visual learning through imaging findings. It combines images with concise, informative text to help radiologists and other medical professionals understand and interpret various conditions or techniques. Some examples are as follows.<sup>13–21</sup>

The steps involved in preparing a review article and pictorial review are as follows:

### 1. Choose a relevant topic:

**Scope:** The chosen topic should be both significant and manageable. It should be broad enough to encompass a substantial body of literature but focused enough to provide meaningful insights.

**Current relevance:** Ensure the topic is timely and relevant, reflecting recent advancements or ongoing debates in radiology and has academic relevance.

### 2. Conduct a detailed literature review:

Databases like PubMed, Scopus, and Google Scholar may be used to gather relevant articles. The literature review should include a thorough search for recent studies, meta-analyses, and review articles related to the topic, which should then be organized into themes and subtopics to structure the review.

### 3. Write the review with a structured outline:

**Introduction:** It should explain the significance of the topic, provide background information, and state the objectives of the review.

**Body:** This section is organized into thematic categories or subtopics. Depending on the topic reviewed, subtopics may include different subtypes under a pathologic entity or various diagnostic modalities and their uses to diagnose a condition. Key findings under each subtopic

must be elaborated with appropriately annotated and labeled example images. Tables may be added to summarize data and highlight key points. A short discussion may be added to analyze, compare, and contrast the findings under each of the subtopics, in addition to discussing trends or gaps in the existing literature.

**Conclusion:** It should summarize the main points and restate the significance of the review highlighting implications for clinical practice. Directions for future research may be suggested.

## Original Article

Writing an original research article in radiology involves presenting new research findings, data, or insights into a specific area of radiology. Unlike review articles or case reports, which summarize existing knowledge or describe individual cases, original articles contribute new knowledge through formally conducted original research and thus the emphasis is on methodology, analysis, and results. Some examples are as follows.<sup>22–35</sup>

The most important steps in a developing an original article are identifying the research question and designing and conducting the research study. These steps are summarized as follows:

### 1. Identify a research question or “hypothesis”:

**Clinical relevance:** The research question should address a gap in current knowledge or a clinical need.

**Feasibility:** The resources, data, and time required to address the research question should be considered and a suitable plan should be formulated.

### 2. Design the study

**Study type:** Determine whether the study will be observational, experimental, or a combination of methods. Common types include cohort studies, case-control studies, cross-sectional studies, and randomized controlled trials.

**Participants/subjects:** The population or sample to be studied has to be defined based on relevant criteria. Participants can be included or excluded based on demographic features such as age and sex or based on clinical features such as symptoms, disease subtype, and response to treatment. These set rules would form the inclusion and exclusion criteria.

**Ethical considerations:** Approval from an ethics review board or institutional review board (IRB) should be obtained as necessary.

### 3. Collection of data:

**Data collection methods:** Patient demographic and clinical details and appropriate radiological images (e.g., MRI, CT, X-ray) should be collected. Data collection methods should be consistent and reproducible, and the collected data should be organized systematically.

**Data management:** The collected data should be secured meticulously to ensure patient confidentiality.

### 4. Analysis of data:

**Statistical methods:** The researcher should ensure the study is adequately powered to obtain valid results. Appropriate statistical tests should be used to analyze data using an appropriate statistical software (e.g., SPSS, R, SAS). Common methods include *t*-tests, chi-squared tests, analysis of variance (ANOVA), and regression analysis.

**Interpretation:** Any statistically significant result should be considered alongside the clinical relevance of the findings.

### 5. Writing the manuscript:

**Title:** Create a concise and informative title that reflects the study's focus and findings.

**Abstract:** Write a structured abstract including the background, methodology, summary of results, and conclusions.

## Introduction

**Background:** Provide context and explain why the study is needed.

**Literature review:** Briefly review relevant studies and identify the research gap.

**Objective:** Aim of the research should be clearly stated with clear mention of primary and secondary objectives of the study as appropriate.

## Methods

**Study design:** Describe the design and rationale.

**Participants/subjects:** Detail how they were selected and any inclusion and exclusion criteria used.

**Data collection:** Explain the methods/procedures and equipment used to collect data.

**Statistical analysis:** Outline the methods used for analyzing the data.

## Results

**Data presentation:** Tables, figures, and graphs should be used to present the findings clearly.

**Textual description:** Summarize the data, including any statistical significance.

## Discussion

**Interpretation:** Discuss the meaning of the results in the context of existing research.

**Clinical implications:** Explain the relevance to clinical practice.

**Limitations:** Any limitations of the study should be acknowledged.

**Future research:** Suggest areas for further investigation.

**Conclusion:** Summarize the main findings and highlight the importance and potential impact of the findings.

**References:** Follow the citation style required by the journal.

## Systematic Reviews and Meta-analyses

Systematic reviews and meta-analyses are comprehensive and methodical approaches to producing new evidence on a specific topic. Conducting such studies in radiology involves a rigorous process of evaluating existing research systematically, based on which scientifically valid results and conclusions are synthesized to address a specific research question. They provide the highest levels of evidence among all research studies and hence form the foundation of evidence-based medicine. Examples are as follows.<sup>36,37</sup>

Given the large number of studies and patients that are analyzed, time and financial resources should be carefully managed, and thus meticulously crafted steps are necessary in developing systematic reviews and meta-analyses.

### 1. Define the research question:

**Specificity:** Clearly define the research question or hypothesis. It should be specific, focused, and relevant to radiology.

**PICO framework:** For clinical questions, use the PICO framework (Population, Intervention, Comparison, and Outcome) to structure the research question.

### 2. Develop a protocol:

**Protocol:** Prepare a detailed protocol outlining the methods for conducting the review. This should include search strategies, inclusion and exclusion criteria, data extraction methods, and statistical analysis plans.

**Registration:** Consider registering the protocol with a database like PROSPERO to ensure transparency and reduce the risk of bias.

### 3. Conduct a comprehensive literature search:

**Databases:** Search multiple databases such as PubMed, Scopus, Web of Science, and others relevant to radiology.

**Search terms:** Use a combination of keywords and Medical Subject Headings (MeSH) terms relevant to the topic.

**Inclusion and exclusion criteria:** Define criteria for selecting studies based on factors such as study design, sample size, and relevance.

### 4. Screen and select studies:

**Initial screening:** Review titles and abstracts to identify studies that meet the inclusion criteria.

**Full-text review:** Assess the full texts of potentially relevant studies to determine if they meet all criteria.

**Data extraction:** Extract key data from each study, including study design, sample size, outcomes, and results.

### 5. Assess study quality and risk of bias:

**Quality assessment tools:** Use tools like the Newcastle–Ottawa Scale for observational studies or the Cochrane risk-of-bias tool for randomized controlled trials.

**Bias evaluation:** Evaluate potential sources of bias, including selection bias, performance bias, and reporting bias.

### 6. Perform data synthesis:

**Data extraction:** Compile data on key variables, outcomes, and study characteristics.

**Descriptive synthesis:** Summarize the findings from individual studies narratively.

**Meta-analysis:** If appropriate, conduct a meta-analysis to statistically combine results from multiple studies.

### 7. Conduct statistical analysis:

**Effect size:** Calculate effect sizes (e.g., odds ratios, risk ratios, mean differences) and their 95% confidence intervals.

**Heterogeneity:** Assess heterogeneity between studies using statistical tests like the  $I^2$  statistic or Cochran's  $Q$  test.

**Model selection:** Use fixed-effects or random-effects models based on the level of heterogeneity.

### 8. Interpret the findings:

**Summary of evidence:** Provide a summary of the overall findings, including the magnitude and direction of effects.

**Clinical implications:** Discuss the implications for clinical practice in radiology.

**Limitations:** Acknowledge limitations of the review and meta-analysis, including potential sources of bias and methodological constraints.

### 9. Write the review and meta-analysis:

**Title and abstract:** Provide a concise and informative title and abstract summarizing the objectives, methods, results, and conclusions.

## Introduction

**Background:** Explain the context and relevance of the research question.

**Objectives:** Clearly state the aim of the review and meta-analysis.

## Methods

**Search strategy:** Detail the search process and databases used.

**Selection criteria:** Describe the inclusion and exclusion criteria.

**Data extraction:** Explain how data were extracted and any tools or forms used.

**Quality assessment:** Outline the methods used to assess study quality.

**Statistical analysis:** Describe the statistical methods used in the meta-analysis.

## Results

**Study selection:** Report the number of studies included and excluded.

**Study characteristics:** Provide a summary of the studies included.

**Synthesis:** Present the results of the meta-analysis, including effect sizes and heterogeneity.

## Discussion

**Interpretation:** Interpret the results in the context of existing research.

**Clinical implications:** Discuss the relevance to clinical practice.

**Limitations:** Address the limitations of the review and meta-analysis.

**Future research:** Suggest areas for future research based on your findings.

**Conclusion:** Summarize the main findings and their implications.

## Ethical Considerations in Medical Publication

Ethics in publishing medical research involves maintaining integrity and transparency. Researchers, ethics boards, journals, and institutions all play a role in upholding these standards to ensure that the research process protects the rights and well-being of research subjects involved, and the published literature is credible, transparent, and trustworthy.

This begins with following ethical principles while conducting research:

- **Ethical review—IRB:** Research involving human subjects should be reviewed and approved by an IRB or equivalent ethics committee. This ensures that the study meets ethical standards and protects participants. Continuous monitoring by the IRB throughout the research process helps address any ethical concerns that arise.
- **Informed consent:** Participants should receive comprehensive information about the study's purpose, procedures, risks, benefits, and their right to withdraw at any time. Consent must be obtained without coercion, ensuring participants understand they can choose not to participate without penalty. Extra care must be taken when research involves vulnerable groups (e.g., children, pregnant women, individuals with cognitive impairments) to ensure their rights and welfare are prioritized.
- **Confidentiality and privacy:** Researchers must implement measures to protect participants' personal information and ensure confidentiality, using anonymization or pseudonymization where appropriate. Data should be stored securely, accessible only to authorized personnel.
- **Risk minimization:** Researchers should carefully evaluate potential risks to participants and strive to minimize them while maximizing the potential benefits of the research. Procedures should be in place to monitor and report any adverse effects experienced by participants during the study.

The publication process should address the considerations discussed in the following section to ensure that the published literature is credible and trustworthy.

## Plagiarism, Duplication, and Conflict of Interest

Plagiarism occurs when researchers use someone else's ideas, words, or data without proper citation. This can take many forms, from directly copying text to paraphrasing without acknowledgment. Ethical publishing requires researchers to cite sources accurately and properly attribute all ideas and findings to their original authors. Use plagiarism detection tools to check for unintended overlap with prior publications. Journals often use software to check for unoriginal content before publication.

Duplication refers to the submission of the same research findings to multiple journals. This practice can lead to several issues such as misleading the scientific community and violation of journal policies. To maintain ethical standards, researchers should disclose prior submissions and inform journals if related work has been submitted or published elsewhere.

Conflicts of interest occur when personal, financial, or professional interests could potentially influence a researcher's work. These can undermine trust in the research process. To address this, researchers should disclose potential conflicts by clearly stating any financial support, relationships with pharmaceutical companies, or other interests that might affect the research.

## Overcoming Challenges in the Publication Process

The path to publishing in radiology is often fraught with challenges, particularly for early-career researchers. One of the initial hurdles is identifying a compelling research question, which requires a deep understanding of the existing literature. For those new to the field, staying current with all relevant studies can be daunting, making it difficult to pinpoint gaps in knowledge that are worth exploring. This is where mentorship becomes invaluable. Experienced mentors can guide researchers in formulating research questions, designing studies, and navigating the complexities of academic publishing. However, finding a mentor who is both knowledgeable and available can be challenging in itself, especially in competitive academic environments.

Once a study is underway, ethical considerations, data collection, and analysis become critical factors. Navigating institutions in obtaining data, while adhering to ethical guidelines, such as obtaining informed consent and protecting patient confidentiality, requires careful planning and oversight. Data collection in clinical settings presents its own set of difficulties, as does the statistical analysis of these data, often necessitating collaboration with specialists. Manuscript writing, another significant challenge, is an art that improves with practice. Crafting a clear, concise, and compelling narrative that effectively communicates research findings takes time and experience. The peer review process, while essential for improving the quality of research, can be a source of frustration due to potential rejections or demands for extensive revisions. To navigate these

challenges successfully, early-career researchers must be resilient, open to constructive feedback, and proactive in seeking out resources and support, including understanding the financial aspects of publication and the importance of selecting the right journal for their work. ► **Table 1** summarizes the components and steps involved in writing different types of radiology manuscripts.

## Conclusion

Publishing research in radiology offers substantial benefits not only for the individual researcher but also for their department

and institution. Engaging in research and publication early in one's radiological career is highly advantageous, as it provides valuable insights into the intricate processes of manuscript preparation and presentation. This early involvement allows for the development of critical skills that are essential for successfully navigating the academic landscape.

Understanding the various types of radiological articles and the specific requirements for preparing each type of manuscript is crucial for early-career researchers. This knowledge significantly enhances the likelihood of producing high-quality work that can be accepted by peer-reviewed journals and disseminated to the broader scientific

**Table 1** Structured overview of the key components and steps involved in writing different types of radiology manuscripts

| Type of manuscript                      | Key steps                     | Details                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Case report                             | 1. Select a case              | Unusual, rare, or challenging case with educational value                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                         | 2. Gather information         | Document patient demographics, clinical history, and imaging studies                                                                                                                                                                                                                                                                                                                                                                                             |
|                                         | 3. Structure manuscript       | <ul style="list-style-type: none"> <li>Title: specific and descriptive</li> <li>Abstract: concise summary</li> <li>Introduction: background</li> <li>Case presentation: detailed patient and imaging information</li> <li>Discussion: interpretation and comparison with literature</li> <li>Conclusion: key takeaways</li> <li>References: cited sources</li> </ul>                                                                                             |
| Case series                             | 1. Define scope               | Select cases with common features; determine objectives                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                         | 2. Collect data               | Gather anonymized patient data and imaging studies                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                         | 3. Structure manuscript       | <ul style="list-style-type: none"> <li>Title: reflects content and purpose</li> <li>Abstract: summary</li> <li>Introduction: context and importance</li> <li>Methods: case selection, data collection, statistical analysis</li> <li>Case descriptions: systematic presentation</li> <li>Results: summary of findings</li> <li>Discussion: analysis and relevance</li> <li>Conclusion: summary and recommendations</li> <li>References: cited sources</li> </ul> |
| Review article/<br>pictorial review     | 1. Choose topic               | Significant, manageable, and relevant topic                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                         | 2. Conduct literature review  | Gather and organize relevant studies                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                         | 3. Write manuscript           | <ul style="list-style-type: none"> <li>Introduction: significance and objectives</li> <li>Body: thematic categories with images and descriptions</li> <li>Conclusion: main points and implications</li> <li>References: cited sources</li> </ul>                                                                                                                                                                                                                 |
| Original article                        | 1. Identify research question | Address a knowledge gap or clinical need                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                         | 2. Design study               | Determine study type, participant criteria, and obtain ethical approval                                                                                                                                                                                                                                                                                                                                                                                          |
|                                         | 3. Collect data               | Gather patient and imaging data systematically                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                         | 4. Analyze data               | Use appropriate statistical methods and software                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                         | 5. Write manuscript           | <ul style="list-style-type: none"> <li>Title: informative and concise</li> <li>Abstract: structured summary</li> <li>Introduction: background and objectives</li> <li>Methods: design, participants, data collection, and analysis</li> <li>Results: data presentation</li> <li>Discussion: interpretation and relevance</li> <li>Conclusion: main findings and impact</li> <li>References: cited sources</li> </ul>                                             |
| Systematic reviews<br>and meta-analyses | 1. Define research question   | Specific and focused using PICO framework                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                         | 2. Develop protocol           | Outline methods for the review, including search strategies and criteria                                                                                                                                                                                                                                                                                                                                                                                         |
|                                         | 3. Conduct literature search  | Search multiple databases; define search terms and criteria                                                                                                                                                                                                                                                                                                                                                                                                      |

(Continued)

**Table 1** (Continued)

| Type of manuscript | Key steps                       | Details                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | 4. Screen and select studies    | Review titles, abstracts, and full texts; extract data                                                                                                                                                                                                                                                                                                                                                                                            |
|                    | 5. Assess quality and bias      | Use quality assessment tools and evaluate bias                                                                                                                                                                                                                                                                                                                                                                                                    |
|                    | 6. Perform data synthesis       | Compile data and perform descriptive synthesis and meta-analysis if applicable                                                                                                                                                                                                                                                                                                                                                                    |
|                    | 7. Conduct statistical analysis | Calculate effect sizes, assess heterogeneity, and select models                                                                                                                                                                                                                                                                                                                                                                                   |
|                    | 8. Interpret findings           | Summarize evidence, discuss clinical implications, and acknowledge limitations                                                                                                                                                                                                                                                                                                                                                                    |
|                    | 9. Write manuscript             | <ul style="list-style-type: none"> <li>Title: informative and concise</li> <li>Abstract: summary</li> <li>Introduction: context and objectives</li> <li>Methods: search strategy, selection criteria, data extraction, and quality assessment</li> <li>Results: study selection and synthesis</li> <li>Discussion: interpretation and implications</li> <li>Conclusion: summary and future research</li> <li>References: cited sources</li> </ul> |

community. By mastering these skills during their training period, radiologists can establish a strong foundation for a successful academic career, contributing to the advancement of medical knowledge and practice.

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#### Conflict of Interest

None declared.

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