

FAQs: Common Questions Concerning the Construction of a Scholarly Article

How to Write a Scientific Paper – An Approach for Medical Dosimetry Students

Writing your first scholarly article for possible publication can be a daunting task for some medical dosimetry students. But with proper preparation, collaboration between practitioners, and attention to detail, the result can be a well-supported research article that contributes to improvements in the best practices of medical dosimetry and professional advancement for the author(s). Medical dosimetry students benefit from numerous hours of clinical and didactic education in health care settings equipped with technological and staff resources. Use your surroundings and already published articles to learn from the experiences of others and take the plunge into scholarly writing.

Medical dosimetry students are encouraged to review the following Frequently Asked Questions (FAQs) that may provide helpful information about choosing a researchable topic, formatting your study, and disseminating the findings.

FAQs – Preparation

Preparation Precludes Panic

FAQ - I'm just a student, what can I write about? Do I know enough to put together a valid study? In other words...how do I choose a research topic?

- **Use your surroundings and educational opportunities.**
- As a medical dosimetry student, you are in an excellent position to choose and conduct a relevant research project. You are exposed to both traditional and cutting edge treatment planning techniques in your clinical rotations and didactic coursework. You work with knowledgeable instructors, clinical medical dosimetrists, and medical physicists who know about existing gaps in the scientific literature.
- Ask, ask, and ask again. **Talk to your instructors and clinical dosimetrists** to find out what they would like to read about in a scientific journal or see during a continuing education event, such as American Association of Medical Dosimetrists (AAMD) meetings. Questions to ask of your supervisors include:
 - What problems do you encounter in medical dosimetry? Can these problems be formatted into a researchable study?

- What emerging technologies do you see in the near future for medical dosimetry? Could I explore these advancements and compare them with current techniques?
 - Do you have any current research projects that I could extend into another study? Or are you working on a current research project that I could help with or contribute to?
 - Or simply KISS – Keep it Simple *Smartie* – Ask your clinical instructors or medical physicists what would be a good topic for a medical dosimetry student just venturing into research.
- Do some light reading. **Review already published articles in peer-reviewed scientific journals to see what topics you could explore.** In the discussion section (toward the end of the article) authors will often introduce “Areas for Future Research.” The authors will introduce additional topics that could be investigated based on their own findings. Recently published papers in scientific journals are a great source for ideas for future research. Make sure the articles you peruse are peer-reviewed from reputable sources.
 - **Choose a researchable topic with relevance for medical dosimetrists.** Select a topic for your study that is researchable within the confines of your academic program. Consider the limitations imposed by budget, time, equipment, mentor support, and reality. It is great to fantasize that you could recreate the original proton synchrotron used for patient treatment in your student research, but start with an achievable project for your first attempt. When you select a topic ask yourself:
 - Is your topic researchable?
 - Is your topic reasonable?
 - Is your topic feasible?
 - Is your topic affordable?
 - Does your topic matter to the greater medical dosimetry community?

FAQ – I have a topic I would like to research. How do I know it is a “good” topic?

- **Complete a literature review.** Before collecting data and analyzing the numbers for your project, do a literature review concerning your proposed topic. Go to peer-reviewed journals and complete a search using common keywords about your topic. You need to know what has already been done in your field of interest. Has the study you are proposing already been completed numerous times by other researchers?
- If you need additional assistance completing a literature review, **approach a librarian at an academic library at a local college or academic medical center.** Medical and academic librarians are trained at locating resources, and they may

have additional resources that you overlooked to find pertinent scientific literature.

- As always, **choose your sources wisely**. Include only peer-reviewed academic journals in your literature review. Also, consider the date of publication before inclusion. An article published 15 years ago may be less relevant than a study from the last five years, unless the older article is considered to be a primary, ground breaking publication.

FAQ – Ok, now I have a research topic in mind. How do I get started? In other words...how do I assemble a research team?

- **Recruit from within.**
 - Sometimes a beginning researcher may feel more comfortable working on a research project with other individuals. Reach out to your peers (fellow students), clinical and didactic instructors, and medical physicists to ask if they want to collaborate on a research project. Often, medical physicists or clinical medical dosimetrists will serve as mentors to students on research projects, especially if you extend an offer for authorship.
 - A word about academic authorship on peer-reviewed scientific journals. The order of the authors' names matters! Look online at various sources that provide information about how to determine the appropriate order for listing authors in a scholarly article. Universal standards for prominence do not exist, but the primary author and last-listed authors have the greatest significance.
- **Recruit from without**
 - You could collaborate with medical dosimetrists, students, or medical physicists at other community or academic radiation oncology centers. If you read an interesting scientific article or watched an exciting talk or webinar at AAMD, contact the lead speaker or author. Tell them how much you enjoyed their topic and highlight what you found most engaging. If you have ideas to extend their research or develop your own idea based on their findings, share your insights and extend an offer for collaboration. You can emphasize that you are a novice researcher and would benefit from learning from them. A little sincere flattery never hurt.
- **Find a motivating mentor**
 - Whether you decide to work individually or in a team effort on your research project, try to find an effective mentor who is experienced in the research process. This individual could offer feedback on your

research topic, study design and methods, timeline, and even serve as an editor during the writing process. Be open to their constructive criticism and learn from their experiences.

FAQ – I have a research team and my mentor asked for my **study timeline**. What is a reasonable timeline for my study?

- To format a study timeline, **write down a detailed list of each step of the research process**. Some people prefer to create a structured outline showing the linear steps of your research while others make a flow diagram with multiple connecting arrows. Whatever approach you take, be explicit and complete. If you have to accomplish a task related to your research (such as literature review, submission for institutional approval, or phantom irradiation), write down what needs to be accomplished and allot an amount of time to accomplish this task.
- Once you have a complete list of tasks for your research project, get out your calendar and decide when you will work on each component. **Set deadlines** and insert reminders in your electronic calendar. Share these deadlines with your research team and mentor, if you have one. Telling someone else when you expect to have a task completed increases your personal responsibility. Be accountable to yourself and others.
- Hope for the best, plan for the worst. **Everything takes longer than you originally think** when planning a research project and writing your scholarly paper. Incorporate more than adequate time for each research task, including time for revisions and rewrites. Be considerate of your team members (and yourself) by setting reasonable deadlines and not expecting overnight turnarounds on draft reviews.

FAQs – Time to Write

Just Do It

FAQ – I conducted my research project and now I'm ready to write about my study and findings. What do I need to include in my article?

- Go to already published sources. **Look at other published articles to see what they included** in their peer-reviewed article. Formatting can vary, but the **main components of a research article** usually include:
 - **Abstract** – A short summary of the entire article. Many publications enact a word limit so be mindful of this and exercise brevity.

- **Keywords** – These are the words that other individuals will use to search for your article. Limit yourself to three to five keywords that describe the focus of your research.
- **Introduction** – Establish the significance of the problem. Why is your research important? What are your research goals and objectives? What questions do you hope to answer in your study? Do you have any hypotheses to list?
- **Literature review** – What has been done in the past about your research topic? Be detailed and provide more than a simple summary. Analyze previous research and show existing gaps in the knowledge base.
- **Methods and Materials** – Provide details about what you did. Enough information should be provided concerning your research steps and analysis that another researcher could replicate your experiment. When in doubt, provide details. Be transparent about statistical methods used.
- **Results** – What were your findings? Create tables and graphs. Make the visuals interesting to a scientific reader but also easy to understand. Consider that many scientific journals only accept black and white visuals. Have full color and black and white options formatted for possible publication.
- **Discussion** – This is the analysis phase. Expand upon your results by analyzing what you did and the importance of your findings. Do not be discouraged if your findings are different than what you expected or hoped for. A lack of statistical significance is not a lack of practical significance. If you experienced limitations in your study, share them. Be transparent and honest in your discussion.
- **Conclusion** – Wrap it up. Provide any additional insight for your readers and suggest areas of future research. Just imagine – future students could take your published study and conduct their own research based on your thoughtful recommendations.
- **References** – Be kind, don't plagiarize. If you use the words, thoughts, or works of another author, you must include a proper citation in the body of your article and acknowledge them in your list of references. Ask your medical dosimetry school if they have the use of electronic software to check for plagiarism. Mistaken omission of a citation is still an omission. Many formats exist for reference lists, some common formats for scholarly articles include the American Institute of Physics (AIP) and the American Psychological Association (APA). See their websites for

updated formatting requirements. Finally, many journals specify the format they require for article submission, so check the website of your preferred journal.

- Send rough drafts to your research team and/or mentor for their feedback and suggestions. Take feedback in a constructive manner and implement suggestions as appropriate. Scholarly writing is an iterative process with multiple revisions, re-writes, and drafts. Many researchers find it helpful to designate a specific time each day to write. Use your previous experience in research scheduling to set deadlines for writing and be accountable to yourself and team mates.

Dissemination of Results – Don't Keep it a Secret

Now that you have chosen a research problem, formulated an achievable study, conducted the research, analyzed all results, and written the paper consider disseminating your findings to the larger radiation oncology community. Submit your finished article to the AAMD writing contest with possible publication in *Medical Dosimetry* or construct a poster for display at the annual AAMD meeting. You could even submit an abstract to speak at a local or national conference to share your exciting research with your medical dosimetry peers. Your medical dosimetry student research is important, and your findings could contribute to improvements in patient care. Continue your endeavors in research and return the favor by reaching out to other beginning medical dosimetry students in a mentoring capacity.