Rev Clin Esp. 2015;215(7):401–404

Revista Clínica Española

www.elsevier.es/rce

SPECIAL ARTICLE

Research: Why and how to write a paper?

R.W. Light

Vanderbilt University, Nashville, TN, USA

Received 26 April 2015; accepted 27 April 2015
Available online 6 June 2015

KEYWORDS
Research;
Publishing;
Scientific writing

Abstract In this article, an internationally renowned pulmonologist with extensive experience in teaching and publishing gives practical advice to young physicians and/or residents on the importance of doing research, the steps for planning a project and also some do's and don'ts of writing and publishing a scientific paper.

PALABRAS CLAVE
Investigación;
Publicación;
Escritura científica

Investigación: ¿por qué y cómo escribir un artículo?

Resumen En este artículo, un neumólogo internacionalmente reconocido, con amplia experiencia académica e investigadora, da consejos prácticos a residentes y médicos jóvenes para llevar a cabo proyectos de investigación y publicaciones científicas.

I have been involved in medical research for more than 50 years.[1] During that time I have both directed the research myself and also mentored many young researchers. The following is a summary of what I have learned during this period.

Why do research?

The first question that one might ask is why anyone, particularly you, should ever want to do research. There are several possible reasons. One might want to become famous, but only rarely does this happen. One might want to get rich, but most researchers do not end up that way. Without question, the income of practicing physicians in the United States is higher than those in private practice.[2] One might want to get a free trip. Certainly, if you perform research and your abstract is accepted for presentation, you might win a free trip to an interesting place. One might want to obtain a good professional position. Certainly a background in research with publications might help in that regard. One might want to answer a question about a diagnosis or treatment for a disease that one of your patients has. This a rational reason to perform research. One might want to help patients. Again, this is a valid reason to perform research. Lastly, one might want to discover something new. The main

E-mail address: rlight98@yahoo.com

reasons that I have performed research are the last three possibilities.

What is necessary to perform research?

Do you need a genius intelligence quotient (IQ) level, a lot of money, an inquisitive mind, dedication, persistence, or organization? In my opinion, the most important element is persistence. I have worked with many individuals who have started a project, but never completed it. They may likely stop at any stage from initially writing the protocol, doing the research or, most commonly, while writing the paper itself. To be a successful researcher one must be persistent and finish the research. In my opinion, the second most important element is organization. By organization I mean arranging one's life so that time is not wasted. Have things organized so you do not spend an hour looking for a paper. Do not waste time complaining about things. I keep a list of things that I need to do on my computer. When I have a certain number of minutes free, I look at the list and see what I can accomplish in that period of time. I believe that dedication is the third most important element. If you are not dedicated to your research and prefer instead to watch football games or go to movies, you are less likely to be successful. The fourth most important element is to have adequate money. Without adequate resources to perform your research, it will obviously fail. Even so, it should be noted that many of the research projects that I have completed did not require any money (e.g., the paper describing Light's criteria[1] and the one describing parapneumonic effusions).[3] The fifth most important element is to have an inquisitive mind. This is important to aid the researcher in formulating the research and analyzing the data. Lastly, one need not have a genius IQ level to perform research. It helps to be smarter than the average person, but being a genius is not necessary.

What are the different types of research?

Case reports are frequently the type of research that one starts with. However, it is difficult to get case reports published unless the case is distinctly unique. Medical journals do not like to publish them because they decrease their impact factor. Reviews of the literature are worthwhile but, again, are hard to get published unless one is invited to write the review. Retrospective reviews of case series generally do not cost any money and are certainly useful. However, their downside is that important data are frequently missing. Prospective reviews of case series do not cost any money either and, if they are organized, missing data should not be a problem. Be aware that it may take time to accumulate the appropriate number of patients. The evaluation of new diagnostic tests is an important part of medical research, when comparing them with the test that has previously been used as the gold standard. The sensitivity, specificity, and receiver-operating curve for the new test should be compared with those of the previous one which was the gold standard. The evaluation of new therapies is one of the most commonly performed types or research. Ideally, it should be done with randomized, double-blind controlled studies. If the study is not blinded, the researcher may be biased in evaluating results. The evaluation of new medical devices is important in advancing medical science. Again, it is best to do randomized controlled studies, but it is frequently difficult to design medical device studies which are blind. Lastly, a large percentage of medical research has to do with basic science. I performed no basic science or animal studies until 1988. When I started doing animal studies I found that they were much easier than patients to recruit. Subsequently, I found that cells were easier to obtain. However, basic science research requires more resources than do many types of human research.

How do you get started to do research?

The first thing you need to do is to develop an idea including a hypothesis. How do you develop the idea? It can be a question raised when taking care of a patient. It can be a question raised by an associate, an attending or a subordinate. It can be a question raised while attending a lecture or while reading the medical literature. It can also be a question raised while dreaming or even while drinking.

Once you have posed the question, it is important to review the literature. It is best not to embark upon a project that has already been done and you need to review the literature to determine if this is the case. Medline is a good place to start. On Medline you should narrow your search as far as is practical. One should obtain a copy or download all pertinent reference papers. Do not rely on review papers. Do not use Wikipedia.

It is important to organize the pertinent references. I recommend transferring all abstracts to your computer. Keep them organized by putting them in alphabetical order by the first author's last name. Make notes on the abstracts as pertinent. Make an outline of what you have found in your review.

Once you have your idea formulated and have reviewed the literature, then discuss the proposal with your associates. In addition, you should evaluate the resources necessary to complete your project. How many patients do you need to answer your question? How much money will it take to conduct the study? Take into account money for personnel, ELISA kits, animals, pharmaceuticals, pipettes, etc. What personnel are needed for the study? What space, including for both the office and laboratory, is necessary for the study? How long will it take to complete the project? In general, it is a good idea to multiply your estimate of required time by a factor of at least two.

Is the research ethical?

For human subjects, the question I ask myself is as follows: would I volunteer for this project if I were qualified to participate? If your answer to this question is no, then the research should not be performed.

Writing the protocol

Before the research can be conducted, a research protocol needs to be written. You should start with the specific objectives and hypothesis. Then, set the stage for your protocol by writing the background information, which is essentially