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### Title

Publication bias begins at home

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A few times a year, I have the opportunity to speak to emergency medicine clinicians about how to get their research published. Somewhere during the session, I'll usually ask how many people have done research, and presented it at a scientific meeting - and the majority of hands go up. I then will ask how many have had their research published; a few hands go up. I then ask - how many of you have research projects you've presented which you have never published. This time, as with the first question, most hands come up, everyone looks at each other, and an embarrassed chuckle is shared.

Prior to all our work being done on computers, failure to publish a completed research study was called the "file drawer phenomenon". An individual performs a study, writes up the abstract, perhaps gets their department to send them to an academic meeting to present it, and FULL STOP. It ends there. The research was seen only by the meeting attendees, and maybe those who happen to read abstracts published in that society's journal. And what if the abstract wasn't accepted for the meeting? Then only the research team, a perhaps a few abstract scorers, know that the work was done.

Studies in just about all specialties, including Emergency Medicine, confirm that only about half of all research submitted to an academic meeting is ever published.<sup>1</sup> While some may just see this as a career opportunity missed, the failure is much greater than this. Doing research often requires some resource investment (even in unfunded studies), and risk to patients (even if it's just loss to privacy). Those "costs" have now been misused. Moreover, others may needlessly repeat the study, getting similar negative answers, because they have no knowledge it's been done before. Most importantly physicians rely on a body of literature supporting their patient care, and if part of that body is missing, we may not be making appropriate choices. As Sir

Iain Chalmers, one of the founders of the Cochrane Collaboration and the James Lind Alliance, wrote in a 1990 article in JAMA “Failure to publish an adequate account of a well-designed clinical trial is a form of scientific misconduct that can lead those caring for patients to make inappropriate treatment decisions.” <sup>2</sup>

We often think of scientific misconduct as an intention to deceive, and indeed, one of the largest impacts of failure to publish has been in the realm of drug trials where studies showing that drugs that were (or are still) in use didn’t work did not reach the printed page. But in most cases, the issue is not one of intellectual dishonesty. When I ask individuals why they haven’t published their work, they often say they didn’t have time, or the paper was rejected once or twice and so they gave up. Some feel the study wasn’t interesting enough, or good enough.

If this sounds familiar, if there is a paper or two in your file drawer (or file folder), here is some insight and advice, gained over the years through both experience and the sage advice of my mentors.

*No Time* – this is the most common response I hear. I get it! To do a good job, you need to have dedicated time to sit down and write. But maybe not as much as you think. You don’t have to write the paper all at once. You can work on it small bites (or bytes), maybe an hour or two at a time.

If you are one of many people intimidated by writing, consider that you already have written quite a bit of your study already. Remember that IRB/ethics committee proposal? Presumably you wrote a Background section that explained the problem you’re trying to address, and the rationale for the study. Well, that’s your introduction. You wrote a

methods section, right? OK, that's two parts of your paper already written or at least in draft.

Before you start the study, you also have to specify the outcomes you are looking for in order to (hopefully) plan your sample size and your data collection methods. So draft some blank tables as you would present the data collected for each outcome. That's the scaffolding for your results.

So you aren't actually sitting down to write, your sitting down to edit, and that is generally much easier.

*"The study wasn't good enough", "no one would be interested",* and various similar themes. Well, *you* thought it was an interesting question. And perhaps not just you, but a few colleagues who performed the study with you. As the provider of emergency medical care, you probably have a pretty good sense of what needs studying. If not you, who? Did you get funding, IRB approval? If so, then others thought the project had merit. Maybe you submitted the paper to a meeting, and it wasn't accepted for presentation. So you got discouraged. But remember they are only reading an abstract. Recall why you did the study to rekindle your own interest.

*Your paper was rejected.* You're in good company. Science rejected the first paper from Kary Mullis on polymerase chain reaction (PCR). Three years later, PCR was named the molecule of the year and Mullis went on to win the Nobel Prize.<sup>3</sup> Hans Krebs, who fled Germany and began working at the University of Sheffield in 1935 had the paper on his eponymous (citric acid) cycle flung back at him by Nature in 1937, and it was published in Holland in *Enzymologia*. Krebs received his Nobel Prize in 1953. How about Richard Ernst, who won a Nobel for

developing nuclear magnetic resonance? His paper describing NMR was rejected (twice) from the Journal of Chemical Physics.

A journal may reject your paper because the subject isn't relevant to their audience, or they recently published several similar articles, or, you've perhaps aimed a bit too high in your choice of journals and they really do have to choose from many good submissions. Or, you haven't done the best job in explaining the importance of your study, or were unclear about your methods, and your paper needs some work. I will also let you in on an open secret among editors – peer review is not infallible. We may misjudge our readers' interests, misunderstand something in your paper; maybe we, like the top journals that in retrospect made some poor decisions are not able to see the possibilities.

I have asked well-known researchers their record for the most journals they ever submitted a paper to and it does get into the double digits. They know that sometimes it takes this effort. You have to really love this work!

But also realise that your study can be viewed by others without being “published” in a journal. A number of options are available for posting your completed paper on the internet where others can read it, and comment. Feedback on preprints can help you improve the paper if you do decide to submit it to a peer-review journal, but most importantly the results of your study can now be found. In the past, many of these were for biologists and physicists, but just this June, MedRxiv was launched sponsored by Cold Spring Harbor Laboratory in New York, Yale University and the BMJ Publishing Company <https://submit.medrxiv.org/>. For BMJ journals, including the EMJ, preprints will not be considered prior publications.

Much is written about publication bias, the idea that a journal will not publish studies with negative findings. But a great deal of publication bias begins at home, on your computer's desktop, your virtual file drawer. Now you have no excuse.

<sup>1</sup> Weber EJ, Callaham ML, Wears RL, et al. Unpublished research from a medical specialty meeting: why investigators fail to publish. *JAMA* 1998; 280:257-9

<sup>2</sup> Chalmers I. Underreporting research is scientific misconduct. *JAMA*. 1990;263:1405-8

<sup>3</sup> <https://www.sciencealert.com/these-8-papers-were-rejected-before-going-on-to-win-the-nobel-prize>. Accessed June 24, 2019