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ABSTRACT.

Learning medical research is an integral part of the development of a holistic physician. Though, not all physicians become clinician-scientists, those who do become enjoy significant privileges over their clinician-only counterparts, mainly in terms of faster career progression and higher employability. Though, to produce more well-rounded clinician-scientists, academic physicians and medical scientists need to make themselves available and be willing to work with and mentor medical students. Besides, a curriculum reform is warranted where students should be encouraged to start learning and conducting research in their first year of medical school. To make the process even easier and help scale these ideas, students should be encouraged to replicate previous highly cited studies, as they can provide a walkthrough for students to follow, thereby necessitating lesser supervision while maintaining the clinical impact that can be made with their time and effort.

Key Words: Research, Medical Students, Journal Impact Factor, Mentorship, Learning, Evidence-based Medicine, Curriculum, Medical School, Medical Education (Source: MeSH-NLM).

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1 MAIN TEXT.

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3 Learning research as medical students is important for various reasons, including the growing
4 acknowledgement that clinician-scientists perform better as physicians.¹ In addition, publishing before
5 completing medical school has shown to carry an even greater promise for the learning physician, both in terms
6 of opportunities for postgraduate training and in academia.^{2,3} This awareness has made basic knowledge of
7 research more accessible, with numerous online and in-person courses to support learning. Though, to truly
8 grasp the process of going from a great idea's selection to publication and gauging the clinical relevance of it
9 requires experience in the field and this is where students find themselves lost, without the help of a mentor.
10 This results in students' articles only making it to journals with very limited readership and scope, so the impact
11 of their work remains limited.

12

13 According to two scientific studies, students who publish during their time in medical school were significantly
14 more likely to continue publishing ($p < 0.001$), publish more papers ($p < 0.001$), and have a mildly greater citation
15 impact after graduation ($p = 0.005$).^{2,3} One of these studies also suggested that most students (87%) who
16 perform research as part of their curriculum (research internship) complete medical training in the minimum
17 amount of time.² These students were also depicted to have a higher chance of securing employment in
18 academic medical centers.² Besides, working under a mentor who focuses on clinical research, as well as one
19 who has prior publication(s) with prior mentees, has shown to increase the likelihood that the student will achieve
20 publication, by successfully completing the tasks required of them.⁴ Furthermore, students who were involved
21 in research during their academic careers had increased motivation, while doctors who had been involved in
22 the same performed better diagnoses.^{5,6}

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24 It is apparent that publishing research in medical school years is difficult.² Therefore, there needs to be a
25 systemic change whereby medical schools adopt research as part of their curriculum² in a system that links
26 clinical physicians who have clinically relevant ideas with eager students who have a growing skill set and time
27 to conduct research on those ideas. Such a setting would also teach medical students valuable traits that are
28 deemed necessary for a learning physician to have, like the etiquettes of working as part of a team with seniors,
29 the ensuing spirit of teamwork,¹ and a quality work ethic, early in their student lives.² Students should be
30 encouraged or even guided as part of the curriculum to read recent articles in widely acclaimed journals, relevant
31 to their module of study. This would help them acclimatize to the characteristics of good quality articles, making
32 writing one such seem like a less daunting task. An effective first step towards execution would be to conduct
33 the research module for students early on in their first year, as opposed to waiting for the clinical years, so as
34 to equip them with the researcher's perspective and the necessary skills earlier on. Additionally, plenty of funding
35 needs to be allocated to hire professors who are proficient in research methodology as well as allow students
36 to gain access to the latest guidelines and articles, and be able to conduct their research projects without the
37 shortage of funds.⁶ Besides, motivating students to participate in research competitions and also share their
38 experience with their juniors will encourage more students to participate in research themselves.⁶ Moreover,
39 integrating compulsory, practically focused statistics courses in their curricula will help students hone the much
40 needed skillset of interpreting statistics in the literature to make their own inferences.⁷ Furthermore, replication
41 studies are a good place for students to build base on while learning, as they provide an approximate

1 walkthrough for researchers to conduct their study on while allowing them to work on what has already been
2 highlighted as clinically relevant; a lot of highly cited studies are never replicated, a necessary step in improving
3 the credibility of the scientific theories derived from these studies.^{8,9} The results obtained from them on the same
4 medical theme across varying demographics of age, gender, geographical locations or even time period, may
5 present with diverse results and thus aid in extending previous hypotheses and/or generating new predictions.^{8,9}

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7 In sum, learning and writing research articles is undoubtedly a learning curve, with students starting small and
8 building up as they refine their skills. However, with the help of more experienced academic doctors and medical
9 scientists, the eagerness in new researchers can be channelized earlier on towards clinically relevant and
10 impactful research studies - a steer that will benefit both, the students and academia at large.

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SUMMARY - ACCELERATING TRANSLATION

The importance of learning about research has increased for medical students around the world. As a result of their increased skill set, it helps individuals climb the job ladder more quickly and increase their employability. Academicians in the medical field need to be more willing to offer their time to teach medical students who want to become academic physicians about their profession in order to make this all more feasible. If their curriculum pushes them to learn research, it can also aid in the objective of creating more academic physicians. This can be made simpler if students do previously published high-impact research because the same research can still have a significant influence when conducted on a different or even similar demographic. Because it takes less mentoring to replicate a study than it does to create one from scratch, replicating studies can also reduce the scarcity of academic mentors.

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