INTERNATIONAL JOURNAL OF STUDENTS' RESEARCH
Volume 1, Issue 1, Year 2011 **www.ijsronline.com**

EXPERT SPEAKS

Conducting research- a beginner's guidelines

Hematram Yadav

Introduction

The increased life expectancy and quality of life has been indirectly attributed to advances resulting from medical research. It has fostered advances in the fields of medicine such as vaccines, antibiotics, drugs for high blood pressure, diabetes, cancer treatment, microsurgery, and the human genome and stem cell research. All these have contributed to the improvement of the health status of people thus improving life expectancy. Research in medicine has been due to the need for better medicines, equipment and improved quality of care. The history of medical science has proved the way to discovering / inventing successful drugs and devices of modern medicine with barely any exceptions to it. Solving pressing problems related to diseases has revealed apparently unrelated questions in many fields related to general medicine such as biochemistry, biology, physics, etc. Some of the well known research advances in medicine include the discovery of X-rays, penicillin, vaccines, genetic engineering and recently stem cell research. The first Nobel Laureate in physics was Wilhelm Conrad Rontgen, who in 1901 was honored for the discovery of X-rays. A professor of physics in Wurzburg, he was curious about the passage of electricity in gases, and this inquisitiveness led him to discover X-rays. The Nobel Prize in Physiology/Medicine for 1945 was awarded jointly to Alexander Fleming, Ernst Boris Chain and Howard Walter Florey for the discovery of penicillin and its curative effect in various infectious diseases. The 1954 Nobel Prize in Physiology / Medicine was awarded to John Franklin Enders and his junior associates Thomas Huckle Weller and Frederick Chapman Robbins for their discovery of the ability of poliomyelitis viruses to grow in cultures of various types of tissue which led to the discovery of polio vaccine. Severo Ochoa and Arthur Kornberg shared the Physiology/ Medicine Nobel Prize (1959) for genetic engineering. All these discoveries would not have been possible without a curious mind and the commitment to research.

Research by medical students

Medical students should be encouraged to develop critical thinking and decision-making skills. Achieving critical-thinking skills can be accomplished by indulging in research and medical writing. Therefore, training for critical thinking should be a part or a pre-requisite of the medical curriculum [1]. In countries all over the world, medical students are encouraged to undertake research projects and publish their results in papers [2]. A study from the UK revealed that out of the medical students from seven medical schools, only about eighty-eight (17%) of the 515 medical students published papers in journals. The main motivation of these students was for personal career progression [3]. In another study in Norway, the Medical Students Research Program was evaluated. The purpose of this program was to increase the recruitment of people with basic medical degree to participate in research. This program has led to an increase in the recruitment of graduated physicians into medical research [4]. A similar study in Holland was done to assess the number of students who published at least one scientific paper during the course of medical studies. Of the 2937 students, 14.5% had published at least one scientific paper during the last three years of their medical studies [5]. In another study on PhD graduates in Denmark about 90% of the PhD students published papers with an average of 6-7 papers including three first authorships [6]. Although some research is done in many countries among the medical students, but still more needs to be done. Medical students should be encouraged to undertake research to improve their decision making and critical thinking skills.

Head, Community Medicine, International Medical University, Kuala Lumpur, Malaysia
Email: Yadav@imu.edu.my

Conducting research

In order for medical students to conduct research projects, they need to understand the fields of medical research and the epidemiological research designs available. Medical research is classified as basic research, applied research or translational research conducted to aid and supports the body of knowledge in the field of medicine. Medical research can also be classified into two general categories i.e. clinical trials and basic research that contributes to the development of new treatments. A clinical trial is a comparison test of a medication or other medical treatment versus a placebo given to two groups of people. The patients are selected randomly to minimize errors. A single researcher in one hospital or clinic can do clinical trials or it can be larger trial involving many centers (nationally or internationally) with several participating researchers.

Commitment, the most important aspect is the first step to undertake a research project. Finding an area of interest and identifying the research question should be the next logical step. At this stage, you may consider literature review on the topic that you have chosen. This will provide the latest knowledge you intend to research on. It is important that you identify a good supervisor who will guide you throughout the project. Then you need to collect the data, analyze it and draw up meaningful conclusions. Finally, you should publish the findings in a reputed journal so that your findings can be shared with fellow research-workers world over.

Ethics in research

One of the basic principles involves understanding research ethics. Although not all research requires ethical approval, but the ones involving humans or animals often do require ethical clearance. Research ethics involves the application of fundamental ethical principles to a variety of topics

involving scientific research. These include the study designs and implementation of research involving human experimentation, animal experimentation, various aspects of scientific misconduct which includes fraud, fabrication of data and plagiarism. There are many ethical codes in different countries and the key agreement includes the 1974 Declaration of Helsinki, the Nuremberg Code and several others. The main issues in research ethics discussed in these codes include some of the following-

- The researcher must strive for honesty in all scientific communications.
- There should not be any fabrication, falsification, or misrepresentation of data.
- He/she must strive to avoid bias in experimental design, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony, and other aspects of research where objectivity is expected or required.
- It is imperative that you carefully and critically examine your own work and the work done by your peers.
- Keep good records of research activities, such as data collection, research design, and correspondence with agencies or journals.
- You must share your data, results, ideas, tools, resources and be open to criticism and new ideas.
- You must honor patents, copyrights, and other forms of intellectual property and give proper acknowledgement or credit for all contributions to research.
- Plagarization is a crime and should be avoided at all costs.
- Avoid discrimination against colleagues or students on the basis of sex, race, ethnicity, or other factors that are not related to their scientific competence and integrity.
- Also show proper respect and care for animals when using them in research.
- Do not conduct unnecessary or poorly designed animal experiments.
- When conducting research on human subjects minimize harm and risks and maximize benefits; respect human dignity, privacy, and autonomy; take special precautions with vulnerable populations; and strive to distribute the benefits and burdens of research fairly.
- Publish the findings in order to advance research and scholarship, not only to advance just your own career.

Funding for research

Funding is an important part of research and can be obtained from national bodies or international organizations. Therefore, it is important for us to be aware of the various organizations nationally and internationally. For instance in the United Kingdom, funding bodies such as the Medical Research Council provides funds to institutions in a competitive manner. Similarly, in the United States about 94 billion dollars were provided for biomedical research in the year 2003 [7]. Private foundations such as the Bill and Melinda Gates Foundation contributed about 3% of the funding in the US. In Australia, a majority of medical research funding is by the National Health and Medical Research Council (NHMRC), whose expenditure on research was nearly $AUD700 million in 2008-09. They must learn how to obtain funding and be able to publish their papers in journals to share their findings.

References

1. Jenicek M, Croskerry P, Hitchcock DL. Evidence and its uses in health care and research: The role of critical thinking. *Med Sci Monit* 2010;17(1): RA 12-17.
2. Michael E Detsky, Allan S Detsky. Encouraging medical students to do research and write papers. *CMAJ* 2007;176 (12).
3. Griffin MF, Hindocha S. Publication practice of medical students at British medica schools: Experience, attitudes and barriers to practice. *Medical Teach* 2011;33(1):e1-8.
4. Hunskaar S, Breivik J et al. Evaluation of medical students' research programme in Norwegian medical schools. A survey of student and supervisors. *BMC Med Educ* 2009;9:43.
5. van Eyke HJ, Hooiveld et al. Scientific output of Dutch medical schools. *Med Teach* 2010;32(3):231-5.
6. Hauge EM. Steady production of scientific papers from medical and pharmaceutical PhD. Graduates from 1993 to 2000. *Ugeskr Laeger* 2009;171(9):704-8.
7. Shaw SE, Petchey RP, Chapman J, Abbott S. "A double-edged sword? Health research and research governance in UK primary care." *Soc Sci Med* 2009;68:912-918.

Competing Interests

The author declares that he has no competing interests.

Funding

Source of funding-None

Please cite this paper as: Yadav H. Conducting research- a beginner's guidelines. *Int J Stud Res* 2011;1(1):14-5.
doi: 10.5549/IJSR.1.1.14-15