Introduction

Chapter 1

Research and Postgraduation

You might be a scientist.....

If your wristwatch has more computing power than an Intel Core i5.

If your ideal evening consists of fast-forwarding through the latest sci-fi movie looking for technical inaccuracies.

If you carry on a one-hour debate over the expected results of a test that actually takes five minutes to run.

If you have never backed up your hard drive.

If you can remember 7 computer passwords but not your wedding anniversary.

If you can type 70 words a minute but can't read your own handwriting.

If you have more friends on the internet than in real life.

If you think that when people around you yawn, it's because they didn't get enough sleep.

If your three-year-old son asks why the sky is blue and you try to explain atmospheric absorption theory.

From http://www.xs4all.nl/~jcdverha/scijokes/8.html#might.be_6

1. Research and Postgraduation

Research

Research is a systematic and organised scientific process to find answers to questions. For example, *a question is raised: Can prazosin prevent deaths in children stung by scorpions?* Assuming the question is not answered already in the whole medical literature, it can be answered by conducting a scientific study. Such a study, if conducted, is systematic because there is a definite set of procedures and steps to be followed in a specified order. It is organized, in the sense it is a planned process and not an impulsive one. The above question is the basis and a starting point of research. If there is no question, there is no research. The answer (s) to question(s) is the endpoint of the research. The answer may be negative ("Prazosin cannot prevent deaths"), but it is still an answer.

Research generates new knowledge that can be used to solve a problem or improve the existing status of a process. A sociologist questioning villagers about their food habits, a statistician doing a meta-analysis of clinical trials, and a geneticist encoding a protein sequence - are all doing research, though using different instruments to attain their objectives, i.e., *a pencil and paper by the sociologist, a computer by the statistician and molecular probes by the geneticist*. Research uses the scientific method to discover facts and their interrelationships, and the new knowledge obtained is applied in practical settings. Research may provide a fresh understanding of a disease process or mechanism of action of a drug, or it may provide new tools for disease management such as vaccines, or it may generate information on the health problems of a community to plan health care strategies.

Importance of research

Knowledge is power, and research is essential for generating information and understanding problems that enable the community to achieve a better quality of life. In the context of medicine, research is undertaken to promote health. There are four important reasons why research should be undertaken:

(a) Promotes basic knowledge - this is the infrastructure upon which drug treatment, disease management, or health care reforms depend.

(b) Development of new tools — These may be drugs, vaccines, diagnostic aids, pesticides, operative techniques, instruments, or rating scales. They are all weapons in the war against disease.

(c) Informs public — In industrialized countries, substantial improvements in health have resulted from changes in lifestyle, diet, and activity — all of which are due to health promotion based on the outcomes of research.

(d) Effective planning: Research provides data for better management of scarce resources and can guide health policies and actions.

The pursuit of research depends on systematic analyses, creativity, exploration, and commitment to truth. The benefits of research, both social and monetary, stimulate demand for it and result in faster progress for the mutual benefit of society.

Box 1.1 **Why do research?**

If we	
Do research	**Don't do research**
1. We can solve our problems.	We have to depend on others to solve our problems.
2. We can attain intellectual independence and stay in the front.	We will depend on others for information and knowledge.
3. We can commercially exploit the fruits of research, leading to economic growth.	We will buy technology and equipment and become poorer.

Having read about the importance of research, it is natural that a question arises in our minds: Where do we, Indian researchers, stand in the international arena of medical research? How many new drugs have we developed and introduced in the market? How many new medical devices have we designed and marketed? How many diseases, syndromes, and treatment regimens were described by Indian doctors? How many scientists in India got the Nobel Prize for medicine? Sadly, we are not in a position to proudly answer these questions, holding our heads high. We are far behind our Western counterparts. Many of us like to believe that Westerners do research because they have better facilities. The reverse is, in fact, true. They create facilities because they want to do research and not that they do research because the facilities are already existing. The facilities were/are developed/created by them and were/are not gifted to them by their Gods from heaven. We do not show adequate interest in research, so we have not established better facilities either. We have miserably failed to create a favorable environment for research. There is a misguided belief that our doctors and scientists are not inferior to those in the West. When most of the original work and scientific inventions emanate from the West, and our contribution so far is very little or nothing to speak of, we wonder how we can call ourselves equals. At the most, we are good photocopies. Even though a photocopy looks better than the original, it is still a photocopy, i.e., *the value attached to it is much less than that of the original*. This is one reason why we should make adequate original contributions if we really want to be considered equals. This is not something that is impossible, and we can do it if we desire to.

Research has become the last priority for many medical teachers whose dictum is patient first, teaching next, and research last (or no research). Many clinicians are happy publishing case reports as a way of increasing the number of publications in their respective curriculum vitae. We have reached a stage where we expect our Western counterparts to solve most, if not all, our problems, including some that are exclusive to our country. Why would a Western scientist be interested in finding an effective treatment for leprosy, which is not a problem in the West? Many believe that meaningful research can only be done in the West and that we need not or cannot do good research. Nothing could be more unfortunate for medical science in India.

At last we have developed an elephant model for elephantiasis. Now we should start testing new drugs on elephants.....

The most deplorable state is the lack of or non-availability of or accessibility of medical data, even on a common disease or some important aspect of medicine. We have come across many theses and dissertations done in India that typically quote statistics from the USA or Europe, not India. The stock answer for this malady is “the Indian data are not available or accessible”. When one of us was examining a PhD thesis from an institute in India, the candidate was asked why he quoted statistics from the USA instead of India. The answer was “the data were not available”. When it was suggested that he could have mentioned at least the data from his hospital, his answer was the same. The thesis was on schizophrenia, and the institute was exclusively for mental disorders.

This situation is not irreversible. Though there are many reasons for the pitiable state of medical research in our country - lack of training and lackadaisical attitude towards research among the medical fraternity are the major ones. Proper training of postgraduate students (PGs) on research methodology and changing their attitude by generating interest in research will go a long way in tilting the scales favorably, even though this process may take decades.

Aims and objectives of a postgraduate (PG) dissertation

Many universities in India have made dissertation work a part of PG curriculum. The aim is to teach a PG student the fundamentals of

research methodology and stimulate an interest in research. A PG student, at the end of his course, should be capable of planning and carrying out an independent research project. It also helps him develop the necessary skills required to do research. Such skills will also assist him to critically analyze medical literature. He may not be able to assess the relative merits and demerits of new drugs and new treatment modalities unless he is familiar with the basics of research.

Dissertation and thesis

A dissertation is not very different from a thesis. A thesis, as The Oxford English Dictionary (Oxford University Press, London, 1933 & 1961) says, is 'a proposition laid down or stated especially as a theme to be discussed and proved or to be maintained against attack'. It is an 'in-depth' study of a particular topic that contributes new information/ knowledge in the field. In contrast, a dissertation is `a spoken or written discourse upon or treatment of a subject in which it is discussed at length'. At the postgraduate level, one is expected to do a dissertation, and what research scholars (Ph.D.) produce is called a thesis. The length of a thesis is usually much longer than that of a dissertation. No specific length is prescribed, though a dissertation should be at least 50 typed pages. It is also generally expected that original work is done as a part of a thesis (as mentioned in the definition). The same is true for the dissertation too, but the volume of work is smaller than that of a thesis. Ph.D. is a full-time research course extending for at least three years, whereas dissertation work is only part-time for medical PG students, and the duration of work does not normally extend beyond two years. Hence, the rigors of a thesis are not usually expected of a dissertation.

Advantages of PG dissertation

The reasons for doing a PG dissertation are many :

1. Learning research methodology - PGs learn and get trained in research methodology.
2. Development of scientific attitude - A doctor must think scientifically and develop a scientific attitude towards patient management (evidence-based medicine) and research. Such an attitude is useful in assessing new approaches to the management of patients/community health.

3. Chance for in-depth study — Dissertation work offers the PGs an opportunity to study a topic in-depth and earn experience in a particular field.
4. Critical reading - The PGs learn how to collect literature on a topic and analyze it critically instead of blindly accepting whatever is published. They get to know how to use the library and the internet for literature search.
5. Special skills - In the course of a dissertation, PGs may develop special skills and interests that they could put to good use in the future.
6. Imparting new information — Contributing new knowledge, however small, is exciting and satisfying.
7. Curricular requirement — In many universities/institutes, a dissertation is a part of the curriculum for earning a postgraduate degree.
8. Publication - Dissertation work can be published in journals, and publications are very important for a successful academic career.

The role of universities

Universities insist on PG dissertation. What they do not insist on are the minimum standards for a dissertation. When a dissertation is submitted to the university, it is sent to the examiners appointed for that particular session. The examiner is expected to evaluate the dissertation and either approve or not approve it. If the dissertation is not approved, the candidate is asked to revise the dissertation along the lines suggested by the examiners. The candidate is, however, allowed to sit for the examination, but his results will be withheld until the dissertation is revised and resubmitted (Some universities do not allow students to take the examination till the dissertation is approved). During the oral examination, the candidate is asked to defend his dissertation. The time devoted to the dissertation in an examination is very little, and examiners tend to point out very obvious errors and do not discuss them in detail. There can be no better way of diminishing the importance of research.

The universities often send copies of the dissertation to the examiners at the last moment. The examiner has no time even to read the summary of the dissertation. At some centers, 10-15 candidates are appearing for the examination. It is not humanely possible for any examiner to critically go through all the dissertations in one or two weeks (sometimes, they are given only one or two days). Indeed, examiners have come for the

examination without even opening the parcel containing the dissertations sent from the university. In the last 10 years, some changes have occurred regarding the evaluation of dissertations. Now, many universities send dissertation copies to 1 or 2 external/internal reviewers well before the examination and approve or disapprove dissertations based on their recommendations. Some universities have retained the viva examination on dissertations in the final examination in addition to external review.

What can universities do to improve this current scenario? If research is to be given importance, then universities should insist on the dissertation being given due weightage during the final examination. A specific number of marks for the dissertation will certainly ensure that more effort will be spent on it. At the end of one and a half years (if the course is three years), an assessment of the progress of the work should be carried out. The university could recruit a team of people (two or three) to conduct an open viva voce on the progress made. The candidate will then be forced to carry out some work before this evaluation, and hence, one can expect the dissertation to be planned and understood better by the candidate and assessed better by the examiners. Universities should also insist on orientation/training courses in research methodology and statistics for the first-year PGs before they choose the topics and submit their protocols. An examination on research methodology and statistics will at least force the PGs to learn these subjects. Currently, the PGs in dental and allied medical courses undergo these courses and examinations. It is a mystery why the medical PG courses have been left out.

The role of funding agencies

Indian Council of Medical Research (ICMR) provides funds for postgraduate dissertations. It provides Rs. 50,000/- per candidate (Rs. 30,000/- when the dissertation is selected, and the remaining amount of Rs. 20,000/- will be released once the completed dissertation is submitted) for 100 postgraduate students. Funds are important if we need to do good-quality research. Hence, to promote this, ICMR can increase this amount and the total number of grants. Other funding agencies should also provide funds for postgraduate dissertations.

The role of guides

Many of us are (were) not lucky enough to have erudite, research-oriented, enthusiastic guides. Some guides take on the mentoring of PGs as a cross to bear, which comes with the job. Some take it as an opportunity to have one more paper and as a statistic to be added to their biodata. Some simply do not bother at all. They leave it up to the PGs to do everything and simply sit back and sign the certificate at the end. Between these extremes, there are varying shades of interest shown by guides.

But do we always have only the guides to blame? The same attitude is prevalent (and at times endemic) among PGs too. There are those who meet the guides and co-guides for the first time with the draft of their dissertation, not having taken the trouble to contact them before this stage, leading to an inevitable stand-off between the two.

The guide is expected to supervise the candidate at all stages of the dissertation. From defining a problem to finally approving and signing the dissertation, he should be involved in all stages. This does not mean that the guide should sit with the candidate and do the experiments or finally write the dissertation (though there are many instances where guides have done so). The guide is expected to teach the PGs the basics of research methodology, cut through the red tape, smoothen administrative problems and help the candidate procure the necessary drugs or instruments, and offer general help in the conduct of the study. During this process, one hopes that some of the guide's enthusiasm (or disinterest) for research will rub off on the student.

The guide should also take it as a challenge to identify relevant areas of research, define challenging problems, and ask the PGs to seek answers to problems facing our health care. This is easier said than done. Some guides have problems selecting a topic, asking students to “look” at dissertations from other colleges, and quickly plagiarizing the topic with a regional feel. Of course, the justification is easy – “*We do not have data from our population*”. While nothing is wrong with this line of thinking, it stifles imagination and does not permit the students to think out of the box.

Box 1.2 **Guides.**

Qualities of an ideal guide	Problems with the guides
Available and approachable	Too busy and no/little time for the student
Knowledgeable, competent, and encouraging	Unethical
Considerable interest in research	Lack of interest in research
Expertise in the field of interest	Poor knowledge of research methodology and statistics
Good communication and feedback	Poor communication skills
Solves administrative problems	Lack of problem-solving skills
Critical but flexible and listens to student	Lack of confidence and commitment
Courteous and respectful	Selfish and rude

There is no universally accepted norm to be nominated as a guide. It appears any faculty member with three years of experience after a PG degree can become a guide. Senior faculty members are allotted students not because they are proficient in research but because of their seniority. One wonders why universities cannot scrutinize the research background of a faculty member before declaring him a qualified guide. Guideship must be earned and not conferred. Universities should ask the individual institutes to conduct a course on research methodology for their faculty and conduct examinations (written and viva) for those aspiring to become guides. In some departments, the staff-student ratio is very low. In such instances, it is very difficult for a guide to think of 3-4 topics per year and guide his PGs. There have been instances of dissertations being copied verbatim from other universities (or sometimes the same university) and submitted with the guide's approval. These "misguides" and the mass production of dissertations have led to waning enthusiasm among faculty members, and the apathy is transmitted to the PGs.

The role of PGs

Most PGs think that research is a waste of time, and they try to finish their dissertation as quickly as possible so as to have more time to devote to their books. This has led to much malpractice, with data being

cooked up, statistics being manipulated, and large portions of the text being copied verbatim from other sources. One of the reasons for this state of affairs is that PGs cannot relate the need for a dissertation to their clinical goals. They believe that research can be carried out only in teaching institutions, and since most PGs do not opt for academics (after getting the degree), they believe it to be a waste of time. Research enriches the understanding of medicine and gives one the knowledge to assess scientific literature critically. It allows one to form his own opinion of drugs and treatments and grants the freedom to be able to scientifically assess the true worth of new discoveries. It is also possible to do research in private practice or a primary health center (PHC). Certainly, there will be some/many constraints and limitations in such settings. However, these obstacles can be overcome by choosing a viable research project with careful planning.

It is time that PGs realized the importance of research and became truly involved in their dissertation projects, working sincerely to make the best use of the opportunity to learn research methodology, gain the practical knowledge and skills of organizing and conducting the work, and have a firsthand experience of learning scientific writing – a skill which is required more and more in today's world. They should also insist on more involvement from their guides. Since it is customary for the postgraduate student to be the first author of publications that evolve from the dissertation work, he has to accept responsibility for the same. It is probably the first time he will be held accountable for their actions. Unless PGs take pride in presenting a good dissertation and guides are challenged to select better topics for their students, mediocrity will be the norm.

Therefore, a dissertation is like a well-choreographed dance. Unless the guide asks the student to come and dance with him, it is bound to be full of wrong moves. It is time for both the guides and PGs to look at the dissertation as an opportunity to learn and add to knowledge.