
Family Practice Grand Rounds

Teaching Research Methodology in a Family Practice Residency Program

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Hershey, Pennsylvania

DR. THOMAS L. LEAMAN (*Professor and Chairman, Department of Family Medicine*): This conference is one of the regular meetings of the Pennsylvania Family Practice Residency Consortium. The Consortium is a grouping of 15 hospitals in Pennsylvania having accredited family medicine residency programs associated with the Department of Family and Community Medicine of The Pennsylvania State University College of Medicine at Hershey. The purpose of the organization is to provide a means for mutual help in development and implementation of family medicine residency programs. The major objective of this meeting is to study methods of teaching

research methodology.

I want now to introduce Dr. Donald Kennedy, who is the Director of the Office of Research for the Department of Family and Community Medicine and is an anthropologist. Most of you know him. He has been with us for four years and I have asked him to talk on the topic of teaching research in family medicine. After he has presented some introductory concepts, I will present a small study to use as an example—as a point for discussion. He has not seen the paper nor have I seen an outline of his remarks.

I would also like to introduce to you Dr. Arnold Shienvold, who is Associate Director of Behavioral Sciences of the Family Practice Centers at both the Harrisburg Hospital and the Polyclinic Medical Center, and is an Adjunct Assistant Professor in the Department of Behavioral Science here. He will tell us about some of his experiences in attempting to develop research interests among family medicine residents.

DR. DONALD A. KENNEDY (*Director, Office of Research, Department of Family and Community Medicine*): I have enjoyed doing re-

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search and thrive on working with people who enjoy doing empirical studies of diverse kinds. The field of family medicine has tremendous possibilities in terms of the breadth of subject areas and kinds of methodology. I would not like anybody associated with the field to think that there is only one way to do it—that there is only one clear-cut way. Part of the difficulty in the field of research is that our didactic encounters with it in medical school have somehow turned us off. My own approach is to try to reactivate any particular curiosity that anybody has about empirical information close at hand—finding an appropriate way to collect that information, to analyze it, and to discover patterns that no one else has seen.

I think Dr. John Geyman has done us all a service in terms of his recent article in *The Journal of Family Practice*.¹ It is very interesting that he presents the same general classifications of research topics that I have used during the past three years. Included in your handout packet along with this article is an article from *Scientific American*.² Somebody has noted that if you put water on a hot surface like a stove or an iron, at moderate temperature, the water mashes out and suddenly disappears. If you put the same amount of water on a slightly hotter surface, it does not do what you predict it would do, that is, disappear faster. It stays around longer. It may be that a simple observation will cause one to try to figure out what does happen. You don't need some very expensive computer, or large and experienced research staff, or your own inhouse biostatistician in order to do interesting and valuable empirical studies.

What are we really talking about when we talk about research? What is it?

DR. ROBERT LEIPOLD (*Director, Family Medicine Department, Geisinger Medical Center*): I have heard it described as, "organized curiosity."

DR. KENNEDY: Right. Where does it start? You need to recognize a *problematic situation*; this particular phrase comes from Northrup—my favorite philosopher in dealing with the issue of scientific research. He notes that the researchable idea frequently stems from some kind of problematic situation which attracts your attention and your curiosity.

Northrup makes another extremely important point, and that is to take sufficient time in the beginning of a possible project. Don't jump quickly

into a specific data-collecting methodology or research design. You don't know which technique is going to be necessary until you have really clarified what it is that is problematic. What is the phenomenon? Where is it? What are the variations of that phenomenon? Who's looked at it before? Until you have clarity on these questions you aren't ready to start a study.

Another point—*never*, if you can possibly avoid it, pick up another person's research project and do it because for some reason or other you feel you need to do research or to be able to demonstrate that you have done a study. That is usually neither productive nor satisfying. The best research is the kind that begins with your own curiosity; you keep pursuing it and finally figure out an answer.

Suppose we now have achieved a sense of clarity about the problem. You think you are pretty well focused in on it. Now what are you going to do? We have arrived at the next stage, choosing among the different kinds of designs, or different methods of data collecting. Design means the overall scheme of collecting information to answer the question of what causes the phenomenon. The most exciting design is the experimental one. This is an excellent approach if you are working in the physics laboratory and have total control of inanimate matter. If you are going to do experimental research designs in biological or behavioral areas, it becomes considerably more tricky. It is essential that this whole project be carefully explained to everyone who participates.

There are other kinds of designs to be used if you cannot get that much leverage on a situation. You can simply describe. You can collect two cases. You can start systematically collecting the same kind of information. Part of the issue of research is the issue of precision of comparable parameters. In other words, you can say, "I have seen a number of patients who have the following kinds of problems. Now what I am going to do is to go over my patient files and write out a whole series of specific dimensions." You can get very specific about the information you want and can go back over all the cases, or you may start fresh. You need to think about the specific kinds of change in behavior or action or mood that you are observing that leads you to the conclusion. In studies of this kind you have to be precise in details. You must be ready to give a full explanation

of how you operationally defined the problem because someone may try to do a similar study and will need to be just as precise and clear in order to have comparable findings. You are entering a special research fraternity, a world of scientific curiosity which is full of skepticism. Organized curiosity is followed by organized skepticism in a scientific fraternity.

We are now ready to proceed to the issue of data collecting techniques. One of the ways of getting information is by observation. Sometimes we need to use instruments and sometimes we observe with the naked eye. One of the most fascinating new tools in the areas of behavioral studies is video tape, for the simple reason that it can be played over and over again—you can go back and check. You can compare. You can have more than one person compare.

Another form of collecting information is the interview. The research interview is different from the clinical interview. The research interview can be focused and highly structured or very free roaming. These interviews are direct interactive experiences. You ask and you observe.

What else can you do?

DR. THOMAS HART (*Assistant Director, Family Practice Program, Harrisburg Hospital*): Ask somebody else?

DR. KENNEDY: Right. Instead of asking the person directly, you may ask a third party. You will have to judge how much direct knowledge and experience that person may have. Anthropologists are informants. They are resource persons. There are usually some people in a town or village who are priceless in terms of helping the anthropologist understand what is going on. One of the quick ways to get on board and not get shot or cooked for supper in the tribal anthropology game is to find the right person who really knows the whole system and how it works. The *key informant* is that kind of person.

There is another category of modality with which to collect information—documents, such as patient charts and billing records.

DR. SHEINVOLD (*Associate Director of Behavioral Sciences, Family Practice Centers, Harrisburg and Polyclinic Hospitals*): Aren't these all observations?

DR. KENNEDY: Yes. Good point. These documents are really a subset of observations.

DR. SHIENVOLD: In fact, in everything you

write down, observation becomes the key method in research.

DR. KENNEDY: Right. The issue is to recognize the kinds of observation that one needs and to know the strengths and weaknesses about the different types. I think there are some excellent opportunities in the kinds of things you do in family medicine. You are interested in the learning process. You are engaged in a variety of clinical training operations. Where are the performance criteria? What happens to the patient? What happens to the resident? Will the resident learn faster? I want you as a physician to be able to handle me as a total person and that means that you need to learn how to observe how I hurt and feel and behave in addition to my blood serum "whatever" as it changes. You have to learn to do these kinds of things and you have to learn to analyze what you have done.

This brings us to the next step—you must thrash out your observations for patterns. First of all, you get frequency distribution which means how many of this vs that. Then you usually want to go from frequency distributions over into percentages because you have to get some sense of what the fractions are. Then you want the correlations. Here you may need to ask for advice from somebody who understands the various mathematical techniques for looking at patterns of correlation in a quantitative way for the phenomenon with which you are dealing.

Now you are ready to report your findings. You are going to have a marvelous time writing this in clear, cogent English and submitting it to some professional journal. They will send it out for anonymous critiques, and they will write back to you and say that they didn't understand it at all. Then you make adjustments, resubmit the paper, have it accepted, and it is published. You have accomplished a recognized piece of research which is then carefully catalogued in the *Index Medicus* and it is terribly exciting!

So that is all I have to say on this particular subject in one unbroken sequence. We will now have a professional paper by Dr. Leaman which we are all going to have fun critiquing.

DR. LEAMAN: About a year ago we became concerned about research in our residency program. Dr. Kennedy said that he thought our residents ought to take a more active part in doing research. I said, "Amen." Then he said that in

order to do that we ought to get our faculty to start doing research of their own. And I said, "Amen." Then he said, if you want to get your faculty to do research, then you as chairman better do some research. And I said, "Uh oh!"

I have been interested for a long time in a group of patients—multiproblem patients—and am beginning to get involved in some fascinating research on this group. But I am a long way from

being able to report that work. I thought it might be useful instead to present a short example of a research paper to use as a point of critique—to see what I have learned—or what I have not learned from Dr. Kennedy during the past several years. So, without the two of us getting together I have written a short paper on something else that is of interest to me. It might not be of interest to anyone else, but it is of interest to me. So here it is.

An International Longitudinal Mortality Study on a Previously Unreported High-Risk Population Group

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The purpose of this communication is to describe an investigation on a previously unreported population group which has been identified as a remarkably high-risk group. An exhaustive search of the available literature has failed to reveal any previous mortality studies directed toward this group. This, in itself, is remarkable and raises a possible line for future investigation. And this lack provides a more than adequate basis for the author's inquiry.

There are, however, three additional hypothetical purposes to this research effort:

1. The study may reveal significant prognostic capabilities.
2. The study may reveal the possible logical significance for other investigators' disinterest in the area.
3. Such a study may suggest certain preventive measures, or at the very least, provide a basis for significant patient education or legislative action.

Methodology

The following sequential steps were enumerated:

1. The target population group was defined as a universe.
2. An hypothesis was formulated to explain the

known phenomenological data.

3. An adequate random sample of the target population was selected.
4. Essential data were collected, recorded, and tabulated.
5. A comparison of the data, under certain variables, was developed and patterns identified.
6. Where appropriate, results of this comparison were subjected to mathematical tests of significance.
7. Appropriate conclusions were then drawn.
8. A series of recommendations were made.

Population Group—Definition

The population group chosen consists of the personages depicted by the principals in Grand Opera. This group was chosen because of the astounding mortality rates evidenced among a group that is generally considered young and healthy. The author was attracted by the proclivity of this group for violent, varied, sudden, and noisy death. The group was further defined as including only the principals of dramatic opera excluding both comic and Grand Old.

A random sample was selected by choosing the first 50 operas described in the author's book collection. Randomization was further simplified by

the fact that there was only one book in the collection.³ The first 50 operas in sequence were utilized, eliminating comic operas as previously noted.*

An hypothesis was developed that this group of personages had a higher than usual mortality rate, that the causes of death varied significantly from established norms, and that the agent responsible for death might also vary from established norms. It was further hypothesized that the significance of such a study might prove to be suboptimal.

Confidentiality

In order to protect confidentiality, and avoid scrutiny by the Human Subjects Review Committee, it was elected to identify personages only by number in the published data, while storing true identity only in the raw archival documentations.

An analysis was therefore performed of the chosen randomly selected population group, recording original year of presentation of the opera, locale, identity of the principals, voice style, outcome in terms of mortality, cause of death where ascertainable, and agent or agents responsible where applicable. For possible purposes of prognostication, the number of acts was also recorded.

Outcome

A total of 50 operas were studied. The number of principals in each opera vary from one to three, with a total of 49 females and 50 males. It was not possible to determine exact ages, but it is understood that one of the group was a teenage boy and the remainder were all young to middle-aged adults.

Among this group there were 27 deaths among the 49 females and 23 deaths among the 50 males, a total mortality rate of 50.5 percent. The mortality rate for females was 54 percent and the mortality rate for males only 46 percent.

An analysis was next undertaken as to the agent responsible for death in order to determine whether the marked difference in mortality rate, between male and female, could be due to a difference in self-esteem as in suicide, or chauvinism as

Table 1. Agents Responsible for Death

	Number	Percentage
Self	16	32
Acquaintance	12	24
Government	8	16
Other Persons	4	8
Non-persons (acts of God)	9	18
Unknown	1	2

in choice of murder subject. Agents responsible for death for the entire group are shown in Table 1.

A further analysis by sex indicated that the number of suicides were identical for male and female. The number murdered by an acquaintance was twice as high for women as for men, and the number of deaths by nonpersons (acts of God) was twice as high for women as for men. The government was responsible for three deaths among the women and five among men. The conclusion is apparent that if chauvinism is a factor it is not manifested in acts of government but is apparent in acts of acquaintances and of God.

Any effort toward prevention must consider primarily the cause of death. The modes of death exhibited by this population group are astonishing in variety. The only causes of death with any significant degree of frequency were death by sharp instrument (28 percent), death by poisoning (10 percent), and death from a variety of illnesses (14 percent). Three were entombed, two strangled, three decapitated, two shot, two lost at sea, two burned, and three crushed. In addition, one young woman danced to death and one jumped to her death. Most astonishing of all, three were escorted directly into *The Beyond*, one abducted by a stone statue. Several of these unfortunate deaths suggest possible means of prevention. For example, in the category of poisonings, two died through inhaling the perfume of the Mancinilla tree and one received poison by kissing the lips of his dead lover. Surely a six percent reduction in mortality rate could be appreciated through a simple legislative program.

From the point of view of prognostication, the

*It was also decided by the project staff to eliminate the four compositions described as the Ring of Niebelung by Wagner because of difficulties experienced by the author in determining which principals were and were not alive.

last mentioned group, those escorted directly to The Beyond, deserves the most study. Analysis of this group provides both disturbing and heartening prospects. The disturbing aspect is that 66 percent of the group went directly to Hell and only 33 percent to Heaven. The encouraging aspect is the time-line trend, in that the two who went to Hell were in the 18th and 19th centuries and the direct trip to Heaven occurred in the 20th century. While the numbers may not be significant, the trend is encouraging. Further study is needed.

Both for the purposes of diagnostic outlook and possible prevention, mortality was next considered on the basis of voice. The results here are mixed, and difficult to analyze. The numbers in several categories are admittedly small. However, the mortality rate among sopranos was 52 percent, among tenors 45 percent, baritones 71 percent, and basses 28 percent. Implications here are obvious. Administration of androgens might be expected to have a significant effect; castration procedures would be definitely contraindicated in males. Additional analyses were made of the causes of death by locale and of the causes of death by date. The findings here were discovered to be of even greater insignificance than those in other comparisons.

The final analysis was of mortality rate by number of acts per opera. Table 2 indicates the number of operas by length and deaths per group.

A mathematical analysis was then conducted to determine the significance of the findings. The calculations by the Rank Difference Method indicated a significance of .485522. However, using

Number of Acts	1	2	3	4	5
Number of Operas	5	8	18	13	6
Number of Deaths	6	5	15	14	10

Product Moment Method of simple correlation, the significance was calculated to be only 0.22. This would seem to correlate well with the total inconsistency and insignificance of the study. However, using this data, plus sex, voice, and time data, it should be possible to construct tables which would permit a physician, called out during the middle of an opera for an emergency, to calculate the outcome with a predictable degree of probability.

Conclusions and Recommendations

1. The high-risk group studied has a propensity for high mortality with almost no morbidity.
2. The level of insignificance of this study has been shown beyond reasonable doubt.
3. Further research is needed to clarify the numerous unsettled issues raised.
4. It is recommended that federal funds be made available to continue this line of investigation.
5. Federal legislation is needed to:
 - a. destroy all Mancinilla trees
 - b. make it illegal to kiss dead lovers
 - c. outlaw all stone statues

DR. KENNEDY: You really caught on on how to do research.

DR. LEAMAN: Do you think I've learned something?

DR. KENNEDY: You certainly have. You have caught the full flavor of my opening remarks, namely that it has to be fun. If it isn't fun, then it really is not your game.

Why was there so much laughing? What was the spoof? Dr. Leaman gave us the whole litany of the way in which scientific research is to be done starting with a hypothesis. He was taking the basic principles and violating them. Now that kind of process is indeed a major ingredient—being able to look at the issue, be spontaneous about it, and enjoy it.

Dr. Geyman's article suggests that the resident physician can play a major role in research in this field, and I don't quite understand that. Why pick on residents? Why not pick on the department chairmen? But why should any of us get involved in research in family medicine?

DR. MARK BEAN (*family practice resident, St. Margaret Memorial Hospital, Pittsburgh*): Nobody knows if what we are doing is therapeutic or is counterproductive or what the outcome is of the different things that we do.

DR. KENNEDY: In other words, there is a need to know through demonstrable empirical evidence. So you need to know and to be able to prove what it is you are attempting to do.

DR. LEIPOLD: This is what Dr. Geyman usu-

ally espouses: to establish family medicine as an academic discipline.

DR. KENNEDY: In other words, there is that need to know but there is also the issue of an academic discipline. What does that mean?

DR. LEIPOLD: When family practice first started it was difficult to define the specialty and to define the field. We chiselled away at that and now, I think, we are an academic discipline, connoting authenticity in the turf we have staked out. There is something different we do.

DR. KENNEDY: In other words, the authenticity, the legitimacy, is part and parcel of being able to establish the academic discipline and maintain it.

If you look at the accumulative record on the basis of hospitalized patients only, and not on a longer time frame of the entire beginning, middle, and end of an episode of illness, there are a whole series of other implications.

DR. LEIPOLD: I have another concern. "Publish or perish" has produced plenty of poor literature.

DR. EVAN PATTISHALL (*Professor and Chairman, Department of Behavioral Science, M.S. Hershey Medical Center*): I think your point is well taken and I would like to comment on that. I think that the beautiful part of Dr. Leaman's spoof is that he presented something that on the surface could appear to be partly credible. My contention is that many of the detailed scientific articles that appear in the journals are really this kind of illogical non-science, and really not significant. Yet, they are published. So if we can sort out some of the wheat from the chaff, we can begin to get at real issues that are important.

DR. SHIENVOLD: The Director of Harrisburg Hospital Family Practice Program, Dr. Brad Strock, asked me to start research projects with the residents. I said, "Oh, that's great. I wonder what they are interested in?" Dr. Michael Asken and I tried to get an idea of how knowledgeable they were in research design and what their interests were and whether they had any topics that we could look at. Of the 14 people we questioned—this also included Harrisburg Polyclinic Medical Center—12 had been involved in research and two had not, but from there things went downhill quickly. When they rated their interest in research in general, it was an average of 3 on a 10-point scale. We generated six possible research topics

from two individuals, the only two who had any interest in doing research. The knowledge of research methodology was very poor and most of it was related to some exposure to basic science research in medical school. Research in basic science has not been perceived as relevant to them in terms of applicability to their clinical skills.

Maybe we need to readjust our expectations. Perhaps we need to take the existing curiosity and build on it, even if only some of the residents exhibit it. Two of the 14 residents in our program came up with six topics. Let's not allow those people to fall aside. We have to start by rewarding that inherent curiosity, fostering it, and slowly nurturing it into a simple study of self and patients. We are retraining curiosity. That is what I call starting at the evaluation level and not starting out at the experimental research level. By showing that research can be clinically oriented or clinically developed, we may get more significant studies, significant in terms of being practical and having a bearing on something we are all concerned about.

Next, it is important to provide role models. If we don't have role models who are exhibiting the same sort of curiosity, we can't expect it from the residents. If faculty members don't have research experience, there is very little help they can give the residents when they do come up with research questions. Finally, perhaps we should provide time for research or provide some rewards instead of what may be punishment for doing research (punishment in terms of what the resident is *not* doing in clinical areas because of the time spent on research). Perhaps time is going to have to be allotted to research if we want to make it important. Offering research assistance, whether secretarial or experimental, also helps.

DR. LEAMAN: We have reviewed some of the basic processes in beginning a research project, we have considered an example of an amateur's research efforts, and we have considered methods of interesting residents in doing research. Thank you very much.

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