Sabbatical Leave Final Report

Certificate in Applied Biostatistics
Sabbatical period July 2014 to June 2015

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DESCRIPTION OF SABBATICAL LEAVE

The purpose of this sabbatical was to enhance my statistical skills in order to further my current and future research efforts. I have found access to a qualified statistician to be a major obstacle in completing a number of scholarly activities. Consequently, my plan for this Sabbatical Leave was to obtain a certificate in biostatistics through an accredited university. After approval of my leave request and consideration of available programs, I elected to enroll in the Biostatistics Certificate Program at the University of Washington in Seattle.

The Leave was a half time leave distributed over a full academic year. I took classes and taught half my normal teaching load simultaneously. This model was employed to allow me to take courses starting in summer 2014 continuing until the middle of June 2015 while minimizing the burden of finding a replacement to teach my specialty topics in the Pharmacy Practice Department.

The first stage of the sabbatical was to take a class in the R programming language. According to the Comprehensive R Archive Network, R is "…a freely available language and environment for statistical computing and graphics…". I had initially intended to take this course in the winter of 2015, however, after more consideration I elected to take it in the summer of 2014 so that I could use the program during my statistics classes in the 2014-2015 academic year. I enrolled in the Introduction to R course offered through the University of California, San Diego Extension (UCSD). The course ran from July 14, 2014 until Sept. 13, 2014. The course was delivered asynchronously online using BlackBoard and Adobe Connect to deliver course materials and lectures.   We covered the basics of data entry and manipulation using the R environment. The course was very valuable and "jump-started" my exposure to R.

I was initially interested in R as a statistical tool for students and faculty in the College of Pharmacy. This program is attractive because it is a free, open source program with broad international support. Many individuals have written programs in R resulting in almost any statistical test being available in this language. Unfortunately, after spending some time with the program I am concerned that the learning curve is too steep for the vast majority of students and faculty. I plan to continue using the program for its strong graphics capabilities, to do pharmacokinetic equation simulations, and for esoteric statistical tests which are not available in Stata or SPSS. However, I believe it is too cumbersome to be viable as a primary statistical program compared to commercially available programs like Stata and SPSS.

The second stage of the sabbatical was to expand my knowledge of R by taking free massive, open, online courses (MOOC) in this language through a website called "Coursera". The classes are 4 week long certificate programs sponsored by Johns Hopkins University. I enrolled in, and successfully completed 3 of their courses thus expanding my abilities in R.

The third stage of the sabbatical was to enroll in the University of Washington Applied Biostatistics Certificate Program. This program is a series of 3 courses offered over the academic year starting in September and finishing in the middle of June. The courses with my achievements are listed below. A list of the extensive topics covered in each course are available upon request. I finished the classes and was awarded the Certificate in Applied Biostatistics as of June 12, 2015.

PUBLICATIONS AND PRESENTATIONS

Allopurinol for the treatment of refractory aggression: a case series. Submission to *The Lancet Psychiatry* is imminent. Co-investigators: Chelsea Carr, Pharm.D., T. Brad Baugh, Pharm.D., BCPS

The results of two residency research projects for Battle Creek Veterans Affairs Medical Center pharmacy residents (Kevin Stack, Pharm.D. and Eric Stack, Pharm.D.) were presented at the Great Lakes Pharmacy Resident Conference. I did the statistical analysis for these projects and the residents presented the posters at the meeting.

CLASSES TAKEN:

Class title	Course number	Institution	Achievement
Introduction to R Programming	CSE-41097	UC San Diego Extension	A+
Medical Biometry I	BIOST 511	University of Washington	SC
Medical Biometry II	BIOST 512	University of Washington	SC
Medical Biometry III	BIOST 513	University of Washington	SC
The Data Scientist's Toolbox		Johns Hopkins University (through Coursera)	SC (with distinction)
R Programming		Johns Hopkins University (through Coursera)	SC
Exploratory data analysis		Johns Hopkins University (through Coursera)	SC
SC = successful completion; these classes were taken "not for credit" so no grade was given, only success in achieving a minimum standard			

APPLICATION OF NEW SKILLS

I have had the opportunity to use my new skills starting approximately March 2015. At that time I assisted two residents from the Battle Creek VA Medical Center with analysis of their residency research projects. Their projects, with my analyses, were presented at the Great Lakes Pharmacy Resident Conference in the spring as noted above.

About that same time, I assisted a student working with Dr. Michael Klepser on a research project that started in the Research Elective course from academic year 2013-2014. That project involved a survey of lay persons' knowledge of viral hepatitis. I have collaborated with Dr. Klepser to do preliminary analysis on a second project comparing two educational methods for teaching people about hepatitis. That analysis led to extension of the project with collection of more data. I understand from a recent conversation with Dr. Klepser that data collection is complete and analysis of the expanded data set will begin once data entry is finished. Since these two projects are related, we are planning to combine the results from both projects into one publication.

I assisted Dr. Margaret deVoest with analysis of a project also started in the Research Elective from 2013-2014. Unfortunately, that analysis revealed little benefit from a training program Dr. deVoest was using and consequently it was decided not to extend the study any further or publish the findings.

I have used R in a number of instances for simulations and/or graphics on my Advanced Pharmacy Practice Experience and to produce the graphics for the allopurinol case series that is being submitted for publication (above). The case series was written in collaboration with a former Ferris College of Pharmacy student.

FUTURE PLANS

Although there are few tangible results from the sabbatical activities thus far, I am confident that a number of the projects currently in progress will come to fruition in the next 1-2 years.

In addition to the work I've already done with Dr. Klepser, I have two active studies for which I am the principal investigator. The first study examines the reasons for switching from one antidepressant to others. That data has been collected and preliminary analysis is complete. I need to rerun the statistics to verify our findings then write a manuscript for submission to a journal. I used SPSS for the original analysis on this project but expect to use Stata for the final analysis since I now have more experience with the latter program.

The second study involves the risk of QTc prolongation (a measure of electrical activity of the heart) with various antidepressants. The preliminary database searches have been completed and we are now doing chart review to extract patients meeting our study inclusion criteria. Once the preliminary dataset has been reduced, we will analyze the data comparing the effects on QTc of several different antidepressants. I expect to use Stata for this analysis and possibly R for generating graphs.

R is well suited to analyze large data sets. I have an idea for a study that will address the association between exposures to some specific risk factors and retinal detachments. My initial idea is to access a large, public health database to retrieve specific data, then analyze the data using R. This idea is VERY preliminary; I need to do a great deal of work to determine the need for, and feasibility of this study. I hope to find a collaborator in the College of Optometry with whom to work on this project.

As noted above, I am still working with Dr. Klepser on two hepatitis projects. He is the principal investigator for both projects and will be responsible for writing the bulk of the manuscripts. Results from the first project have been analyzed and returned to Dr. Klepser for his review. More data has been acquired so the expanded dataset now needs to be entered and re-analyzed. We hope to complete this project in the next few months.

I expect to continue to expand my understanding and proficiency with R. There are a number of free, open, online courses available, and countless websites dedicated to promoting use of the program. With perseverance and desire, I hope to continue to learn to use the program and find applications for it in my teaching and scholarly activities.

IMPACT OF LEAVE ON MY PROFESSIONAL RESPONSIBILITIES

As a result of the knowledge and skills I acquired during the Sabbatical Leave I have assumed responsibility for four new lectures. These include three lectures in the Drug Information/Clinical Literature Evaluation course (PHAR 540), and one lecture in the Integrated Case Studies course (PHAR 589). The specific lectures are:

PHAR 540: Drug Information/Clinical Literature Evaluation
Study Designs
Study Variables and Samples
Risk Ratios and NNTs/NNHs (number needed to treat/number needed to harm)

PHAR 589: Integrated Case Studies
Journal Club

At least as important as the above accomplishments from my perspective is the ability my new skills provide for me to analyze my own data in the future without the need of a statistician's input. That has been a rate-limiting step in the past that has led to significant delays in project completion. I am aware that my limited training does not make me a statistician, but it does allow me to design better studies and do straightforward statistics on my own. I can also communicate better with statisticians and other faculty in the College of Pharmacy who have more statistical experience than I. I am confident that these new skills will continue to pay dividends in the future. I exceeded all of my personal goals and objectives during the Sabbatical Leave and am excited about applying my newfound knowledge in the future.

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