THE DEVELOPMENT OF A COURSE FOR GRADUATE STUDENTS ON ETHICS IN BIOSTATISTICAL PRACTICE

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Biostatisticians are involved in research and evaluation from concept development to design to analysis and dissemination. They bring unique skills to these endeavors and are placed in positions of responsibility that require the consideration of ethical issues in many situations.

The Biostatistics Department of Boston University SPH sponsors three graduate programs in biostatistics:

- Master of Public Health concentration (MPH)
- Master of Arts degree (MA)
- Doctor of Philosophy degree (PhD).

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BUSPH MPH students required to take a core course in Health Law but course does not cover many aspects of ethics that a public health professional in biostatistics will encounter in practice.

PhD students who receive funding on our Federal pre-doctoral training grant are required to attend seminars on the responsible conduct of research

Also required to serve on the BU Medical Center IRB in one of several “clinical rotations”

Starting this September, we will require all new PhD students to attend these seminars.

Our MA students are not required to take a course in health law or ethics.

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Many graduate students have little or no collaborative experiences as biostatisticians when they enter our programs

We determined that a part of a comprehensive formal education in biostatistics at the graduate level should include a course in the ethical practice of biostatistics.

Today we describe the educational content of our 10-hour seminar course with examples of work by students and their comments and perceived value of course.

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The course covers topics that include:

Responsible conduct of research
Certification for the conduct of research on human subjects
Legal responsibilities for data management plans
Issues around conflict of interest

Students review governmental guidelines and regulations, published papers in the literature on these topics, and consider case studies that have been developed at our institution, by the ASA working group on ethics in statistical practice, and by the BERD working group of national CTSA Consortium.

Students provided documents and web links to readings and videos to be examined and evaluated as homework

Main concepts in these reviewed and students then sent home with assignments to critique in case studies

Students present critiques in class with group discussion

American Statistical Association ethical guidelines for statistical practice

The American Statistical Association has posted on its website a set of ethical guidelines for statistical practice (http://www.amstat.org/about/ethicalguidelines.cfm) covering::

- Professionalism
- Responsibilities in Publications and Testimony
- Responsibilities to Research Subjects
- Responsibilities to Research Team Colleagues
- Responsibilities to Other Statisticians or Statistical Practitioners
- Responsibilities Regarding Allegations of Misconduct
- Responsibilities of Employers

A case study on ASA web site, “After the fact Co-author”, posted by John Gardenier:

“As a professional statistician, you are called by a colleague to examine and "bless" a biomedical experimental report. You are urged to do it quickly because the report has already been submitted and accepted for publication in a prestigious journal in the author's field. One of the reviewers, however, had suggested that a quick review by a statistician might be in order. To your horror, the report appears to be utter statistical nonsense… You suggest that he eliminate the statistical portions and describe his work based on the qualitative reasoning which he obviously used. Initially very angry, he calms down and says, "I'll leave the contents alone, but I will add you as a coauthor. How's that?"

In critique, a student wrote,

"*The first guideline that was violated was that of professionalism…because it was clear that the statistician did not approve of the methodology and sampling methods implored in this report, he should not have his name associated with results that did not provide valid results… also the guideline regarding the responsibilities in publications and testimony… It also violates the guideline to be responsible to funders, clients and employers, as well as responsibilities to research team colleagues as well as responsibilities regarding allegations of misconduct*.",

demonstrating the multi-faceted nature of a commonly experienced problem faced by biostatisticians in practice.

Protection of human subjects in research studies

We employ three sets of material/documents that guide discussion around the protection of human subjects in research studies:

These include:

The on-line “Collaborative Institutional Training Initiative (CITI)” site (http:\\www.phrp.nihtraining.com) and provide each student the opportunity to obtain Federal Human Subjects Protection certification.

Belmont Report: principles of Respect for Persons, Beneficence, and Justice as advanced in the Belmont Principles

Documents and web sites re: VIOXX controversy (http://www.npr.org/series/5033105/vioxx-the-downfall-of-a-drug).

Responsible conduct of research (RCR)

Boston University has developed course materials on RCR that address the following subjects:

Creating the Research Record and Managing Data: How and Why
Mentor/Trainee Responsibilities
Data Acquisition, Management, Retention, Ownership
Research Misconduct

Research Collaborations: ethics, collegiality and agreements
Mentorship
Collaborative Science
Data Sharing
Data ownership

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Publication: What, When, Why, How and by Whom
Objectivity in Research
Oversight of Scientific Misconduct

Research Misconduct
Data Management and Selection

In addition, view the report on “60 Minutes” on the recent controversy surrounding a cancer study at Duke University

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Case study on Responsible Conduct of Research, “CASE 3B” of the Association of American Medical Colleges

A hypothetical biochemistry postdoctoral student, Chantal
In her paper for this project, Chantal essentially takes the entire literature review from a recently published journal article and copies it into her own background section, verbatim. She includes the footnote citations for each article mentioned in the literature review, but it is not clear if she even added a citation for the article from which she duplicated the background

In review of this case, a student wrote:

"The most noticeable problem in Chantal's story is the bold-faced plagiarism the postdoctoral student exhibited…These issues mainly leave Chantal at risk, because she is going to be first author of this paper, and plagiarism is a very serious offense. The laboratory director is also at risk, since plagiarism would have happened in his own laboratory and he is the principle investigator, therefore, responsible for this research. Beyond that, anyone else listed as a coauthor would be at risk of a bad reputation due to plagiarism"

Federal rules and requirements regarding ownership of data, data management plans and data storage

Extensive amount of electronic data accumulated in many clinical research studies, important to establish principled operational framework for data management.

In this session, use materials produced by Boston University and from a 67-page, comprehensive document by the Council of Governmental Relations (COLGR) .

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Sharing of data between investigators

Dr. Duncan Saco succeeds in research program. He has offered access to final research data for a project. A colleague requests access to preliminary data but is refused. As a result, colleague refers to the Vice President for Research at Dr. Saco's institution. Guidelines indicate that agencies such as NSF and NIH have prescribed how research results including data should be shared, though data creators have right to decide when to release them. Private foundations or corporate sponsors can additional provisions on a grant's terms and conditions, the need to share preliminary data, etc.

In critique of this scenario, a student noted,

"Dr. Saco's refusal seems reasonable… has also made it clear that he was willing to offer final research data
…Dr. Saco's research is partially funded by private foundations and corporate sponsors. As my first thought, it is natural for the sponsors to make their own provisions as additions to widespread NIH policies…If that is the case, it is hardly up to Dr. Saco or the Vice President for Research whether or not to make data publicly accessible."

Also, “though a mutual agreement is reached between Dr. Saco and Dr. Katie on sharing before early publication of final research data, the process may not be able to go on without counsel from the institution’s technology transfer office for the purpose of protection of any potential intellectual property. Or sometimes, both need to concur that application of data to a specific purpose is limited.”

Research Conflict of Interest (COI)

Boston University policy on research financial conflict of interest covers wide range of research projects, bench and clinical studies. Key concepts include:

- Individuals Affected
- Conflicts of Interest
- Disclosure Financial Interests to be Disclosed
- Examples of Activities Requiring Disclosure
- Time of Disclosure and Supplemental Disclosure
- Functions of the COI Committee:
- Review of Disclosure Forms and Other Information
- Determination of Whether a Conflict of Interest Exists
- Management, Reduction and Elimination of Conflicts of Interest
- Human Subject Research
- Committee Report to the Provost

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A case study in conflict of interest is the following based on similar case study published by the Committee on Science, Engineering, and Public Policy.

Mei Li is a graduate student working in the lab of Assistant Professor Brava

Dr. Brava has a research agreement with a private company, BioSupport, that also pays her $20,000 per year as a consultant

Findings of Mei Li's research reflect poorly on drug, Y, produced by this company

Dr. Brava would like her to soften presentation of these findings

Chair of department attempts to internally resolve this problem.

In evaluation of this case study, a student wrote,

"*When researchers intentionally deceive their funding agency by e.g. falsifying the information, they are violating fundamental research standards and basic societal values.*

These actions are regarded as the worst violation of scientific standards since they undermine the trust on which science is based. Within the scientific community, the effects of scientific misconduct can be devastating, in terms of damaged reputations.

Here if Mei adopted Dr. Brava's suggestions and when the truth was unveiled one day, her scientific career would be terminated due to this stain. Meanwhile, BioSupport would also suffer in the long term, if the drug Y was finally commercialized and unexpected adverse effects began to emerge among patients. In other words, institutions, researchers and funding agency like pharmaceutical companies can suffer grievous setbacks jointly."

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Student Feedback

We have asked students to provide feedback on the conduct of the course and how they view its value in the development of their careers as biostatisticians. One student wrote about the seminar sessions,

"*I really enjoyed the … discussion… as it provided lots of time to address individual questions and discuss case studies in greater detail… As students and young professional in biostatistics it's important for understand that we are not simply responsible for the statistical methods and analyses. Instead we are responsible for the ethical practice from start to finish, including the ethical management of data after the completion of the research.*"

Another student wrote,

"*I think the ... assignment to get human subject research certification was a great idea, as it not only prepped us with an overview of the ethical topics and responsibilities at hand, but also gave us something practical to utilize in the profession.*

I also appreciated the data utilization and storage discussions. I did not realize the definition of data and policy surrounding its utilization and retention could be so complicated. The use of case studies surrounding this topic helped me understand the complexity of data retention, problems that could be caused by it, and possible policies and solutions to these issues."

Conclusion

Our seminar on ethics in biostatistical practice provides graduate students with the opportunity for growth in a vitally important aspect of a career in biostatistics.

The students perform thorough analyses of case studies and engage in lively discussion of ethical issues with their colleagues, thus enriching their graduate educational experiences and preparing them in their future careers to address ethical concerns based on sound principles.

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