Please Post

Ohio State - Cleveland Clinic Foundation – Case Western Reserve University

Biostatistics Joint Symposium
Thursday, April 10, 2014

At the Faculty Club, 181 Oval Dr S, Columbus OH

Schedule

Before 11:00 a.m.	Poster set up
11:15 – 11:45	Jiayang Sun, Case Western Reserve University "An Ovarian Cancer Survivorship Study: Challenges and Some Findings"
11:45 – 1:15	Buffet Lunch
1:15 – 1:45	Vince Vu, The Ohio State University "Synergy and Variation in Hand Shape During Reach-to-Grasp Movements"
1:45 – 2:15	Sandra Griffith, Cleveland Clinic Foundation "Proximity and Gravity: Modeling Conditional Distributions of Heaped Self-Reported Count Data"
2:15 – 3:00	Break and poster session
3:00 – 4:00	Keynote address

"Bayesian Ideas Are (Slowly) Revolutionizing Medical Research—A Personal Perspective"

Keynote Speaker: Donald Berry,
University of Texas M.D. Anderson Cancer Center

CALL FOR POSTERS: *Graduate students, postdoctoral fellows, staff researchers, and faculty from the three participating institutions are invited to present posters on your work at the Symposium. Please contact Dennis Pearl (Pearl.1@osu.edu) to reserve a spot in the poster session.*

April 10, 2014 OSU-CCF-CWRU Biostatistics Joint Symposium

ABSTRACTS

An Ovarian Cancer Survivorship Study: Challenges and Some Findings

Jiayang Sun
Case Western Reserve University

Ovarian cancer is the most lethal gynecologic disease in the United States, with more women dying from this cancer than all gynecological cancers combined. Ovarian cancer has been termed the "silent killer" because *many* patients do not show clear symptoms at an early stage. Currently, there is no approved early diagnostic tool; effective treatments for late-stage patients are limited. However, more than 80% of ovarian cancer patients actually showed symptoms, even when the disease was still limited to the ovaries. Some late-stage patients do live a long time. To research and find some possible reasons or factors that contribute to the long-term survivorship of ovarian cancer survivors, we designed and conducted an online comprehensive Ovarian Cancer Survivorship Survey from 2009 to 2013, hosted at the Women Cancer Network, wcn.org. The survey included 1502 fields grouped into 15 groups of questions encompassing all stages of ovarian cancer management from the patient or her caregiver's perspective, including initial symptoms that led to diagnosis, biomarkers, medical history, environment, treatments and pre- and post-diagnosis lifestyle.

In this talk, we showcase our valuable survey, present methodological challenges in studying such resulting data and its connection to Patient-Reported Outcome Measurement Information System (PROMIS)–related research, provide a glimpse of our OVA-CRADLE (Clinical Research Analytics and Data Lifecycle Environment), and then focus on our analyses and findings in the pre-diagnosis symptoms (one of aims), using a combination of text mining and statistics. This work is a testimony of the collaboration by a team of researchers from multiple scientific areas and stakeholders.

Synergy and Variation in Hand Shape During Reach-to-Grasp Movements

Vince Vu
Ohio State University

Accurate description of the variability of finger movement is central to understanding nervous system production of manual dexterity and critical to the successful engineering of brain-machine interfaces for the control of prosthetic devices. Toward that goal we analyze kinematic data from an experiment on the relationship between hand movement and cortical activity in a non-human primate. We develop multivariate 1) functional registration and 2) dimension reduction techniques for decomposing the variation of multiple trial recordings of finger motion during reach-to-grasp movements. We show that the variation can be decomposed into dynamic, interpretable components representing synergies of movement that are common across trials and trial-specific idiosyncratic variation.

Proximity and Gravity: Modeling Conditional Distributions of Heaped Self-Reported Count Data

Sandra Griffith
Cleveland Clinic Foundation

Self-reported count data typically exhibit measurement error, often manifesting as a preponderance of round numbers. Heaping, a form of measurement error that occurs when quantities are reported with varying levels of precision, offers one explanation. A doubly-coded data set of daily self-reported cigarette counts with both a conventional retrospective recall measurement (timeline followback) and an instantaneous measurement with a smooth distribution (ecological momentary assessment), allows us to model the conditional distribution of a self-reported count given the underlying true count. Our model incorporates notions from cognitive psychology to conceptualize the selection of a self-reported count as a function of both its proximity to the true value and the intrinsic attractiveness of the reported numeral, which we denote its gravity. We develop a flexible framework for parameterizing the model, allowing gravities based on characteristics specific to the applied context or data-driven gravities based on empirical frequencies. This approach will be illustrated through application to the motivating cigarette consumption data and simulation studies.

"Bayesian Ideas Are (Slowly) Revolutionizing Medical Research—A Personal Perspective"

Donald Berry,
University of Texas M.D. Anderson Cancer Center

Abstract

Bayesian theory is elegant and intuitive. But elegance may have little or no value in practical settings. The "Bayesian Revolution" of the last half of the 20th century had little impact on biostatisticians. They were busy changing the world in other, arguably more important ways, and they neither needed nor wanted what Bayesians had to offer. The randomized controlled trial (RCT) was introduced in the 1940s and it changed medical research from an art into a science, with biostatisticians guiding the process. To make matters worse for the reputation of Bayesians, we seemed to be anti-randomization and therefore anti-science. Biostatisticians and other medical researchers feared that Bayesians wanted to return medicine to the dark ages of whim and superstition.

The standard approach to clinical experimentation is frequentist, which has advantages and disadvantages. One disadvantage is that the unit of statistical inference is the entire experiment. As a consequence, the RCT has remained largely unchanged. It is still the gold standard of medical research, but it can make research ponderously slow. And simple RCTs—those addressing single questions in large populations--are not well suited for the "personalized medicine" approach of today, identifying which types of patients benefit from which therapies. The most exciting aspect of this story is the potential for utilizing Bayesian ideas in the future to build ever more efficient study designs and associated processes for developing therapies, based on the existing solid foundation.

In this presentation I'll chronicle the increased use of Bayesian approaches in medical and biological research over the last 25 or so years. I'll discuss applications in genetics, DNA fingerprinting, athletic doping, and cancer screening. But my principal focus will be Bayesian adaptive clinical trials (employing randomization), especially those that answer many questions. The Bayesian approach is ideally suited for updating information over the course of the trial and for modifying the trial's future course based on the trial's goals. It is possible to have many treatment arms. Including combination therapies enables learning how treatments interact with each other as well as the way they interact with biomarkers of disease that are specific to individual patients. I will give an example (called I-SPY 2) of a Bayesian adaptive biomarker-driven trial in neoadjuvant breast cancer. The goal is to efficiently identify biomarker signatures for a variety of agents and combinations being considered simultaneously. Longitudinal modeling and Bayesian predictive probabilities play vital roles in the trial.

The 2014 Biostatistics Joint symposium is funded by the Statistics Department, the College of Public Health, and the Biostatistics Center of The Ohio State University.