Collaborative and Methodological Research Interests

Roslyn A. Stone, Ph.D.
Associate Professor of Biostatistics
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Education

Math	B.A.	Douglass College
Math Education	M.A.	U. of Kansas
Statistics	M.S.	Montana State U.
Biomathematics	Ph.D.	U. of Washington

Interests:	Likelihood, generalized linear models, survival
Dissertation:	Methods of Analysis of Dose Escalation Experiments

Academic Appointments at the University of Pittsburgh

1986-1990	Depts. of Clinical Epidemiology and Preventive Medicine, School of Medicine
1986-present	Dept. of Biostatistics, GSPH
2001-present	Co-Chief, Data Core Center for Health Equity Research and Promotion (CHERP) Pittsburgh VA Healthcare System

Teaching

Dept. of Biostatistics:

- BIOST 2090, Generalized Linear Models
- BIOST 2087, Biostatistics Consulting
- BIOST 2046, Analysis of Cohort Studies
- BIOST 2084, Discrete Multivariate Analysis
- BIOST 2025, Biostatistics Seminar

School of Medicine:

- BIOST 2041-2042 equivalent
- Short course in Logistic Regression
- Clinical Epidemiology

Collaborative Research-1

"Poisson Regression" Phase

Diabetes Epidemiology: Geographic, temporal, genetic and racial variation in incidence of IDDM

Occupational Epidemiology: model cancer mortality in large cohorts as a function of occupational exposures

"Survival" Phase

Occupational Epidemiology:

- Complex time-dependent covariates
- Cohort, case-cohort, and case-control studies

Collaborative Research-2

"Outcomes" Phase: the Pneumonia Patient Outcomes Research Team (PORT)

Large, multi-faceted study of processes and outcomes of care for patients with community-acquired pneumonia

- Administrative databases
- Prospective cohort study
- Physician surveys

Identify factors associated with hospital admission, clinical stability, in-hospital mortality, and discharge

Document processes of care (duration and choice of parenteral antibiotics, length of stay)

Outcomes Research

- Compare treatment strategies rather than treatments *per se* to identify effective and efficient strategies
- Projects are organized by the medical question rather than statistical properties of the response
- Typically deal with (log)normally-distributed, nominal, ordinal, and (discrete and continuous) time-to-event outcomes within the same study

Collaborative Research-3

- The Pneumonia PORT provided the requisite data to plan three subsequent guideline implementation studies

"Cluster-randomized study" Phase

- "**Length of Stay**"- implement guidelines to inform the conversion to oral antibiotic and discharge decisions in 7 Pittsburgh sites
- "**Roche**"-implement a guideline regarding both empiric antibiotic therapy and discharge at 31 sites nationally
- **EDCAP**- 3 levels of implementation of guidelines regarding the admission decision and recommended processes of care at 32 sites in CT and PA

Collaborative Research-4

"Multi-level modeling" Phase

- EDCAP
- Multiple multi-center studies at the VA

"Disparities" Phase

- CHERP's mission is to identify, understand, and ameliorate disparities in health and health care within vulnerable populations

Focus is now on developing and implementing interventions

VA Healthcare System

- The VA maintains national inpatient and outpatient databases as well as pharmacy, mortality, and cost databases

- Missing data is a major problem
- Selection bias is rampant
- Imbalances across sites and small numbers limit many analyses of disparities

Methodologic Research

- My methodologic research is driven by problems that have arisen in my collaborative research
- Problems are driven by scientific question rather than underlying statistical framework
- Interface of theory and methodology; research primarily involves adapting existing methods rather than developing new methods

Areas of Research

- Misclassification
- Missing data
- Combining disparate data sources
- Agreement
- Imbalance

Misclassification

Ren dissertation: The EDCAP guideline recommends outpatient care for low risk patients; about 20% of patients appear to be misclassified as low risk

What is the true impact of the intervention given this level of misclassification?

Solution: A Bayesian approach using MCMC and both retrospective and prospective ascertainments of risk status

Shen dissertation: Ordinal Markov models for misclassification with respect to menopausal status

Missing Data

- Youk dissertation: Adapted a log-linear model approach to adjust rates for misclassification to multiply impute missing race in a Poisson regression setting; compared estimates to non-parametric approach used in OCMAP

- Mor pilot study: Document biases induced by commonly used approaches to account for missing race in VA administrative data and develop defensible statistical approaches to impute race

Combining Disparate Data Sources

- Gause dissertation: Recognized that case-control and case-cohort likelihoods could be expressed in a common framework using martingales and suitable weighting; developed a way to combine case-control and case-cohort data in a single analysis

- Brandom thesis: Combined dose-response curves based on independent and dependent data

- Dorman papers: combined data from cohort and case-control studies to estimate population incidence; follow-up study used the bootstrap to compare estimates

Agreement

- Stone and Mor: used log-linear models to quantify agreement between prospectively and retrospectively ascertained time to stability based on discrete survival models

- Kastango dissertation: developed a log-linear model approach to identify an atypical rater in a study with a categorical outcome

Imbalance

- Stone and Mor: ENAR tutorial on role of imbalance in GEE analysis of Length of Stay and Roche studies

- Chen dissertation: designing studies of disparities to detect main effects, interactions, and random effects of specified size given a population distribution across multiple sites

Other Current Research

- Developing a tutorial on multi-level logistic models based on the EDCAP study
- Developing and validating prognostic scores for heart failure and pulmonary embolism
- Developing propensity-score models to compare:
  - Users and non-users of the VA Healthcare system
  - Inpatients and outpatients in EDCAP
- Validating the VA BIRLs database against the National Death Index

Other Current Research, cont'd

- Accounting for regression to the mean when comparing interventions in patients with diabetes and poor glycemic control
- Documenting statistical issues in disparities research
- Assessing racial disparities in recommended processes of care within the EDCAP study