

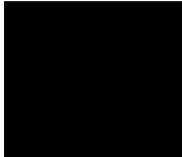
CURRICULUM VITAE  
**Xiao-Hua Andrew Zhou, Ph.D.**

**1. Biographical Information**



**2. Education**

Undergraduate: Sichuan University, B.Sc. (Mathematics)  
Graduate: University of Calgary, M.Sc. (Statistics)  
Ohio State University, Ph.D. (Biostatistics)  
Postdoctoral: Harvard University, Postdoctoral fellow (Biostatistics)



**3. Licensure**

Not applicable

**4. Professional Positions**

*Academic & Hospital Appointments*

1984 - 1985      Lecturer, Department of Mathematics, Sichuan University, China

1993 - 1997      Assistant Professor of Medicine, Division of Biostatistics, Indiana University School of Medicine, Indianapolis IN

1997 - 2002      Associate Professor, Division of Biostatistics, Indiana University School of Medicine, Indianapolis IN

2002 - 2003      Affiliate Associate Professor, Department of Biostatistics, School of Public Health and Community Medicine, University of Washington, Seattle, WA

2002 -            Director and Research Career Scientist, Biostatistics Unit, Northwest Health Services Research & Development Center of Excellence VA Puget Sound Health Care System

2003 - 2005      Research Professor, Department of Biostatistics, School of Public Health and Community Medicine, University of Washington, Seattle, WA

2004 - 2005      Adjunct Research Professor, Department of Psychiatry and Behavior Sciences, School of Medicine, University of Washington, Seattle, WA

2005 -            Professor, Department of Biostatistics, School of Public Health and Community Medicine, University of Washington, Seattle, WA

2006 -            Senior Biostatistician, National Alzheimer's Coordinating Center, University of Washington, Seattle, WA

2005 -            Adjunct Professor, Department of Psychiatry and Behavior Sciences, School of Medicine, University of Washington, Seattle, WA

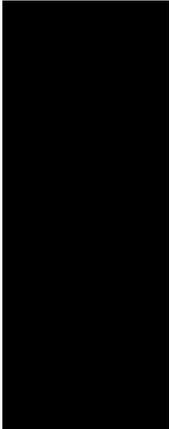
2004 -2008      Adjunct Professor, Department of Health Economics and Management, Peking University, Beijing, China

- 2009 - Adjunct Professor, Beijing International Center for Mathematical Research (BiCMR), School of Mathematical Sciences, Peking University, Beijing, China
- 2005 - Adjunct Professor, Department of Mathematics, Chinese Academy of Science, Beijing, China
- 2005- Adjunct Professor, Sichuan University, Chengdu, China

### *Visiting Appointments*

- 2/2000 – 4/2000 Visiting Fellow, Centre for Mathematics and Its Applications, the Australian National University, Canberra, Australia
- 9/2000 – 12/2000 Visiting Faculty, Department of Biostatistics, Harvard School of Public Health, Boston, MA

### **5. Honors, Awards, Scholarships**



Ohio State University Fellowship  
 Elected Fellow, Royal Statistical Society  
 Elected Member, The International Statistical Institute  
 Mitchell Prize, The International Society for Bayesian Analysis and Section on Bayesian Statistical Sciences of American Statistical Association (With K. Hirano, G. Imbens, and D. B. Rubin.)  
 Elected Fellow, The American Statistical Association  
 Research Career Scientist Award, U.S. Federal Government  
 Department of Veterans Affairs  
 Distinguished Overseas Young Scientist Award, National Natural Science Foundation of China, National Natural Science Foundation of China  
 Advisory Committee Service Award, U.S. Federal Government Food and Drug Administration

### **6. Professional Activities, outside of University of Washington**

#### *Membership in Professional Societies*

American Statistical Association  
 International Biometric Society  
 Institute of Mathematical Statistics

#### *Editorial Services*

- 1999-2005 Editorial Board Member, *Statistics in Medicine*  
 2005- Associate Editor, *Statistics in Medicine*  
 2001-2007 Associate Editor, *Biometrics*  
 2005- 2010 Co-Editor, *Health Services and Outcomes Research Methodology*  
 2006- 2009 Associate Editor, *Statistica Sinica*

#### *Professional Service – National and International*

- 1996 - 1998 Member, Traveling Course Committee, Council of Chapters, American Statistical Association

- 1998 - 2000      Chair, Traveling Course Committee, Council of Chapters, American Statistical Association
- 2000              Program Chair–Elect, Section on Statistics in Epidemiology, American Statistical Association
- 2001              Program Chair, Section on Statistics in Epidemiology, American Statistical Association
- 2001              Member, Program Committee for ENAR, International Biometrical Society
- 2001              Member, Program Committee for ICOSA 2001 Applied Statistics Symposium, International Chinese Statistical Association
- 2003              Chair–Elect, Section on Statistics in Epidemiology, American Statistical Association
- 2004              Chair, Section on Statistics in Epidemiology, American Statistical Association
- 2005-              Founding President, VA Statisticians' Association (VASA) – U.S. Federal Government Department of Veterans Affairs
- 2010              Chair-Elect, Section on Health Policy Statistics, American Statistical Association

*Professional Service - State and Regional*

- 1994              Vice-President, American Statistical Association Central Indiana Chapter
- 1995              President, American Statistical Association Central Indiana Chapter

*National Study Section and Advisory Committee Activities*

- 1994              Member, Agency for Health Care Policy and Research (AHCPR) Dissertation Grant Panel
- 1994 - 1996      Member, Data Monitoring Board for Cooperative Study in Health Services, "Multi-Site Study of Computer Generated Reminders to Enhance Adherence to Standards of Ambulatory Care," Department of Veterans Affairs
- 1995              An external reviewer for a grant, dissemination study section of AHCPR
- 1999 - 2001      Member, Special Emphasis Panel, National Cancer Institute
- 2001 - 2002      Member, Special Emphasis Panel, National Institute of Mental Health
- 2002              Ad Hoc Member, Social Sciences, Nursing, Epidemiology and Methods-5 Study Section [SNEM-5], NIH
- 2003 - 2007      Regular Member, Biostatistical Methods and Research Design Study Section (BMRD), NIH
- 2004 -2008      Member, Advisory Committee in Center for Devices and Radiological Health, U.S. Food and Drug Administration (FDA)

- 2008 -Present     Consultant, Advisory Committee in Center for Devices and Radiological Health, U.S. Food and Drug Administration (FDA)
- 2008- Present     Consultant, Oncologic Drugs Advisory Committee in Center for Drug Evaluation and Research, U.S. Food and Drug Administration (FDA)
- 2008- Present     Consultant, Hematology and Pathology Committee in Center for Devices and Radiological Health, U.S. Food and Drug Administration (FDA)
- 2004 - 2006       Ad Hoc Member, HSR&D Scientific Merit Review Board for Special Populations, U.S. Federal Government Department of Veterans Affairs
- 2006 - Present     Regular Member, HSR&D Scientific Merit Review Board for Special Populations, U.S. Federal Government Department of Veterans Affairs
- 2008               Member, Board of Scientific Counselors (BSC), Division of Epidemiology, Statistics, and Prevention, National Institute of Child Health and Human Development, National Institute of Health.

*Manuscript Reviewer For*

American Journal of Epidemiology  
 Annals of Internal Medicine  
 Biometrical Journal  
 Biometrics  
 Diabetes Care  
 Health Services and Outcomes Research Methodology  
 Journal of Agricultural, Biological and Environmental Statistics  
 Journal of American Statistical Association  
 Journal of Statistical Planning and Inference  
 Medical Care  
 Medical Decision Making  
 PharmacoEconomics  
 Statistics in Medicine

**7. Bibliography**

*a) Refereed research articles*

**Statistical Methodology ( \* Senior Author)**

**1992**

1. **Zhou XH**, Blumenthal S. Two-stage reliability tests for new series systems. J Stat Plan Infer 1992; 33:345-366.

**1993**

2. **Zhou XH**. Maximum likelihood estimators of sensitivity and specificity corrected for verification bias. Commun Stat 1993; 22(11): 3177-3198.

**1994**

3. **Zhou XH.** Effect of verification bias on positive and negative predicted values. *Stat Med* 1994; 3:1737-1745.

**1995**

4. **Zhou XH.** Testing an underlying assumption on a ROC curve based on rating data. *Med Decis Making* 1995; 3:276-282.

**1996**

5. **Zhou XH.** Empirical Bayes combination of estimated areas under the ROC curves using estimating equations. *Med Decis Making* 1996; 16:24-28.
6. **Zhou XH.** A nonparametric maximum likelihood estimator for the receiver operating characteristic curve area in the presence of verification bias. *Biometrics* 1996; 52:299-306.
7. **Zhou XH, Gastonis CA.** A simple method for comparing correlated ROC curves using incomplete data. *Stat Med* 1996; 15:1687-1693.
8. **Zhou XH, Katz BP, Holleman E, Melfi CA, Dittus R.** An empirical Bayes method for studying variation in knee replacement rates. *Stat Med* 1996; 15:1875-1884.

**1997**

9. **Zhou XH, Melfi CA, Hui SL.** Methods for comparison of Cost Data. *Ann Intern Med* 1997; 127(8): 752-756.
10. **Zhou XH, Gao S, Hui SL.** Methods for comparing the means of two independent log-normal samples. *Biometrics* 1997; 53:1129-1135.
11. **Zhou XH, Gao S.** Confidence intervals for the lognormal mean. *Stat Med* 1997; 16: 783-790.
12. Gao S, **Zhou XH\***. An empirical comparison of two semi-parametric approaches for modeling multivariate failure time data. *Stat Med* 1997; 16:2049-2062.
13. Hui SL, Gao S, **Zhou XH**, Johnston Jr CC, Lu Y, Gluer CC, Grampp S, Genant H. Optimal universal standardization of multiple measurements: Application to dual-energy X-ray absorptiometry. *J Bone Miner Res* 1997; 12:1463-1470.

**1998**

14. **Zhou XH.** Estimation of the lognormal mean. *Stat Med* 1998; 17: 2251-2264.
15. **Zhou XH, Higgs R.** COMPROC and CHECKNORM: Computer programs for comparing accuracies of diagnostic tests using roc curves in the presence of verification. *Comput Meth Prog Bio* 1998; 57:179-186.
16. **Zhou XH.** Estimating the mean value of occupational exposures. *Am Ind Hyg Assoc J* 1998; 59:785-788.
18. **Zhou XH, Rodenberg CA.** Estimating an ROC curve in the presence of non-ignorable verification bias. *Commun Stat* 1998; 27(3): 635-637.
19. **Zhou XH.** Comparing accuracies of two screening tests in a two-phase study for dementia. *J Roy Stat Soc C – App* 1998; 47:135-147.

20. **Zhou XH**. Comparing correlated areas under the ROC curves of two diagnostic tests In the presence of verification bias. *Biometrics* 1998;54, 453-470.
21. **Zhou XH**. Correcting for verification bias in studies of a diagnostic test's accuracy. *Stat Methods Med Res* 1998; 7:337-53.
22. Hui SL, **Zhou XH**. Evaluation of diagnostic tests without gold standards. *Stat Methods Med Res* 1998; 7:354-70.

#### 1999

23. **Zhou XH**, Brizendine EJ, Pritz MB. Methods for combining rates from several studies. *Stat Med* 1999; 18:557-566.
24. **Zhou XH**, Castelluccio P, Hui SL, Rodenberg CA. Comparing two prevalence rates in a two-phase design study. *Stat Med* 1999; 18:1171-1182.
25. **Zhou XH**, Tu W. Comparison of several independent population means when their samples contain non-zero log-normal and possibly zero observations. *Biometrics* 1999; 55(2): 645-651.
26. **Zhou XH**, Perkins AJ, Hui SL. Comparisons of software packages for generalized linear multilevel models. *Am Stat* 1999; 53(3): 282-90.
27. Tu W, **Zhou XH\***. A Wald test comparing medical costs based on log-normal distributions with zero value costs. *Stat Med* 1999; 18:2749-2762.

#### 2000

28. **Zhou XH**, Higgs RE. Assessing the relative accuracies of two screening tests in the presence of verification bias. *Stat Med* 2000; 19:1697-1705.
29. **Zhou XH**, Gao S. One-sided confidence intervals for means of positively skewed distributions. *American Stat* 2000; 54:100-104.
30. **Zhou XH**, Tu W. Confidence intervals for the mean of diagnostic test charge data containing zeros. *Biometrics* 2000; 56:1118-1125.
31. **Zhou XH**, Tu W. Interval estimation for the ratio in means of log-normally distributed medical costs with zero values. *Comput Stat Data An* 2000; 35(2): 201-210.
32. Hirano K, Imbens GW, Rubin DB, **Zhou XH**. Assessing the effect of an influenza vaccine in an encouragement design. *Biostatistics* 2000; 1:69-88.
33. Rodenberg CA, **Zhou XH\***. ROC curve estimation when covariates affect the verification process. *Biometrics* 2000; 56: 1256-62.
34. Tu W, **Zhou XH\***. Pairwise comparisons of the means of skewed data. *J Stat Plan Inf* 2000; 88(1): 59-74.
35. Perkins SM, Tu W, Underhill MG, **Zhou XH**, Murray MD. The use of propensity scores in pharmacoepidemiologic research. *Pharmacoepidem Dr S* 2000; 9(1): 93-101.

#### 2001

36. **Zhou XH**, Li C, Gao S, Tierney WM. Methods for testing equality of means of health care costs in a paired design study. *Stat Med* 2001; 20:1703-1720.
37. **Zhou XH**, Eckert G, Tierney WM. Multiple imputation in public health research. *Stat Med* 2001; 20:1541-1549.
38. **Zhou XH**, Stroupe KT, Tierney WM. Regression analysis of health care charges with heteroscedasticity. *J Roy Stat Soc C – App* 2001; 50(3): 303-312.

#### 2002

39. Zhang DD, **Zhou XH**, Freeman DH, Freeman JL. A non-parametric method for the comparisons of partial areas under ROC curves and its application to large health care data sets. *Stat Med* 2002; 21: 701-715.
40. **Zhou XH** and Harezlak J. Comparison of kernel smoothing method for ROC curves. *Stat Med* 2002; 21: 2045 - 2055.
41. **Zhou XH**. Inferences about population means of health care costs. *Stat Methods Med Res* 2002; 11: 327-339.
42. Frangakis CE, Rubin DB, **Zhou XH**. Clustered encouragement designs with individual noncompliance: Bayesian inference with randomization, and application to advance directive forms. *Biostatistics (with Discussion)* 2002; 3: 147-164.
43. Frangakis CE, Rubin DB, **Zhou XH**. Rejoinder to discussions on clustered encouragement designs with individual noncompliance: Bayesian inference with randomization, and application to advance directive forms. *Biostatistics* 2002; 3: 173-177.
44. Obuchowski N, **Zhou XH**. Prospective studies of diagnostic test accuracy when disease prevalence is low. *Biostatistics* 2002; 3: 477-492.
45. Tu W, **Zhou XH\***. A bootstrap confidence interval procedure for the treatment effect using propensity score subclassification. *Health Services and Outcomes Research Methodology* 2002; 3:135-147.

#### 2003

46. Hall P, **Zhou XH**. Nonparametric estimation of component distributions in a multivariate mixture. *Ann Stat* 2003; 31: 201-224.
47. **Zhou XH**, Castellucio P. Nonparametric analysis for the ROC areas of two diagnostic tests in the presence of nonignorable verification bias. *J Stat Plan Inf* 2003; 115: 193-213.
48. **Zhou XH** and Ramsey S. Assessing the equality of means of health care costs. *Expert review of Pharmacoeconomics and Outcomes Research* 2003; 3, 561-567.

#### 2004

49. Peng L, **Zhou XH\***. Local linear smoothing of receiver operating characteristic (ROC) curves. *J Stat Plan Inf* 2004; 118: 129-143.
50. **Zhou XH**, Qin GS, Tsao M. New intervals for the difference between two binomial proportions. *J Stat Plan Inf* 2004; 123: 97-115.

51. **Zhou XH**, Castelluccio P. Adjusting for non-ignorable verification bias in clinical studies for Alzheimer's disease. *Stat Med* 2004; 23: 221-230.
52. Lui KJ. and **Zhou XH**. Testing non-inferiority (and equivalence) between two diagnostic procedures in paired-sample ordinal data. *Stat Med* 2004; 28:545-549.
53. Lui KJ., **Zhou XH.**, and Lin CD. Testing Equality between Two Diagnostic Procedures in Paired-Sample Ordinal Data. *Biometrical J* 2004; 46: 642-652.
54. Ren H., **Zhou XH.**, and Liang H. A Flexible Method for Estimating ROC Curve. *J Appl Stat* 2004; 31: 773-784
55. Jiang H and **Zhou XH\***. Bootstrap confidence intervals for medical costs with censored observations. *Stat Med* 2004; 18: 3365-3376.

#### 2005

56. Wang L and **Zhou XH**. A Fully nonparametric diagnostic test for homogeneity of variance. *The Canadian Journal of Statistics* 2005; 33: 545-558
57. **Zhou XH**, Qin S. Improved confidence intervals for the sensitivity at a fixed level of specificity of a continuous-scale diagnostic test. *Stat Med* 2005; 24:465-477.
58. **Zhou XH**, Qin GS. A new confidence interval for the difference between two binomial proportions of paired data. *J Stat Plan Inf* 2005; 128:527-542.
59. **Zhou XH** and Dihn P. Nonparametric confidence intervals for one and two-sample problems. *Biostatistics* 2005; 6:187-200.
60. Song X. and **Zhou XH\***. A marginal model approach for analysis of multi-reader multi-test receiver operating characteristic (ROC) data. *Biostatistics* 2005; 6: 303-312.
61. **Zhou XH**, Castelluccio P, and Zhou C. Nonparametric estimation of ROC curves in the absence of the gold standard. *Biometrics* 2005; 61: 600-609.

#### 2006

62. Welsh A and **Zhou XH\***. Estimating the retransformed mean in a heteroscedastic two-part model *Journal of Statistical Planning and Inferences* 2006; 136(3): 860-881.
63. **Zhou XH** and Liang H. Semi-parametric single-index two-part regression models for health care costs with zero values. *Comput Stat Data An* 2006;50(5): 1378-1390.
64. Wang L and **Zhou XH**. A Fully Nonparametric Diagnostic Test For Homogeneity of Variance." *Canadian Journal of Statistics* 2005; 33 (4): 545-558.
65. Qin G, Hsu YS, and **Zhou XH\***. New confidence intervals for the difference between two sensitivities at a fixed level of specificity. *Stat Med* 2006; 25: 3487-3502.
66. Chen YH and **Zhou XH\***. Interval estimates for the ratio and difference of two lognormal means. *Stat Med* 2006, 25: 4099-4113.

67. Qin G and **Zhou XH\***. Empirical likelihood inference for the area under the ROC curve. *Biometrics* 2006, 62: 613-622.
68. Harel O and **Zhou XH\***. Multiple imputation for correcting verification bias. *Stat Med* 2006; 25: 3769-3786.
69. Dinh P and **Zhou XH\***. Nonparametric statistical methods for cost-effectiveness analyses. *Biometrics* 2006; 62: 576-588.
70. **Zhou XH**, Qin G, Lin H, and Li G. Inferences in censored cost regression models with empirical likelihood. *Statistica Sinica* 2006, 16: 1213-1232.
71. **Zhou XH**, Qin G, and Maciejewski ML. Estimating the VA health care cost using a semi-parametric heteroscedastic two-part model. *Health Serv Outcomes Res Method* 2006, 6: 69-80.
72. **Zhou XH** and Li SM. ITT analysis of randomized encouragement design studies with missing data. *Statistics in Medicine* 25: 2737-2761.

#### 2007

73. Mercaldo N, Lau KF, and **Zhou XH\***. Confidence intervals for predictive values with an emphasis to case control studies. *Statistics in Medicine*, 2007, 26(10): 2170-2183.
74. Harel O and **Zhou XH\***. Multiple imputation: Review of theory, implementation, and software. *Statistics in Medicine*, 2007, 26(16): 3057-3077.
75. Harel O and **Zhou XH\***. Multiple imputation for the comparison of two screening tests in two-phase Alzheimer studies. *Statistics in Medicine*, 2007, 26(11): 2370-2388.
76. Song X, Ma S, Huang J, and **Zhou XH**. A semiparametric approach for the nonparametric transformation survival model with multiple covariates. *Biostatistics*, 2007, 8(2): 197-211.

77.



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#### 2008

80. **Zhou XH** and Li, S. Wilcoxon based group sequential designs for comparison of areas under two correlated ROC curves. *Statistics in Medicine* 2008, 27: 213-223.
81. **Zhou XH**, Li, CM, and Yang Z. Improving interval estimation of binomial proportions. *Phil. Trans. R. Soc. A.* 2008, 366: 2405-2418.

82. **Zhou XH** and Cheng H. A computer program for estimating the re-transformed mean in heteroscedastic two-part transformation models. *Comput Meth Prog Bio.* 2008, 90: 210-216.
83. Song X. and **Zhou XH**. A semiparametric approach for the covariate specific ROC curve with survival outcomes. *Statistica Sinica* 2008, 8: 947-965.
84. Chi YY and **Zhou XH**. Receiver operating characteristic surfaces in the presence of verification bias . *Journal of Royal Statistical Society Series C (JRSS C)* 2008; 57 : 1-23.
85. **Zhou XH**, Lin H, and Eric Johnson. Nonparametric heteroscedastic transformation regression models for skewed data with an application to health care costs. *Journal of Royal Statistical Society Series B (JRSS B)* 2008; 70: 1029-1047
86. Tang L., Emerson S., **Zhou XH**. Nonparametric and semiparametric group sequential methods for comparing accuracy of diagnostic tests. *Biometrics* 2008; 64: 1137-1145.
87. **Zhou XH** and Lin, H. Semi-parametric maximum likelihood estimates for ROC curves of continuous-scale tests. *Statistics in Medicine* 2008; 27: 5271-5290.
88. Chi, YY and **Zhou XH**. The need for reorientation toward cost-effective prediction. *Statistics in Medicine* 2008; 27: 182-184.

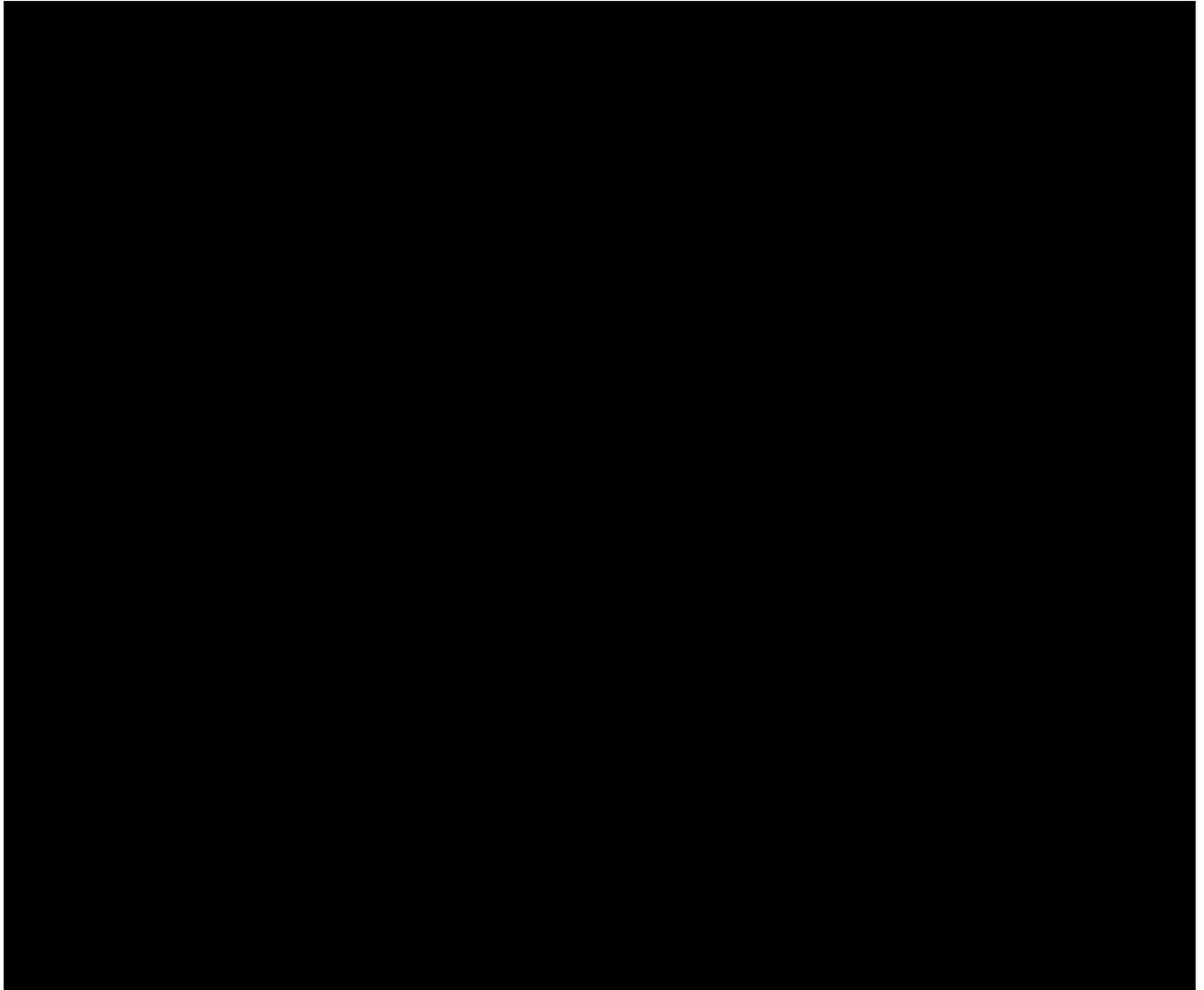
## 2009

89. Talor L and **Zhou XH\***. Multiple imputation methods for treatment noncompliance and missing Data. *Biometrics* 2009; 65: 88-95.
90. Talor L and **Zhou XH\***. Relaxing latent ignorability in the ITT analysis of randomized studies with missing data and noncompliance. *Statistica Sinica* 2009; 19: 749-764. .
91. Tang L and **Zhou XH\***. Semiparametric inferential procedures for comparing multivariate ROC curves with interaction terms. *Statistica Sinica* 2009; 19: 1203-1221.
92. **Zhou XH**, Hu N., Hu G., and Root M. Synthesis analysis of regression models with a continuous outcome *Statistics in Medicine* 2009; 28: 1620-1635.
93. Chen H, Geng Z, and **Zhou XH\***. Identifiability and estimation of causal effects in randomized trials with noncompliance and completely nonignorable missing data (with discussion). *Biometrics* 2009; 65: 675-691.
94. Hsieh H. N., Su H.Y., and **Zhou XH\***. Interval estimation for the difference in paired areas under the ROC curves in the absence of a gold standard test. *Statistics in Medicine* 2009; 28: 3108-3123.

## 2010

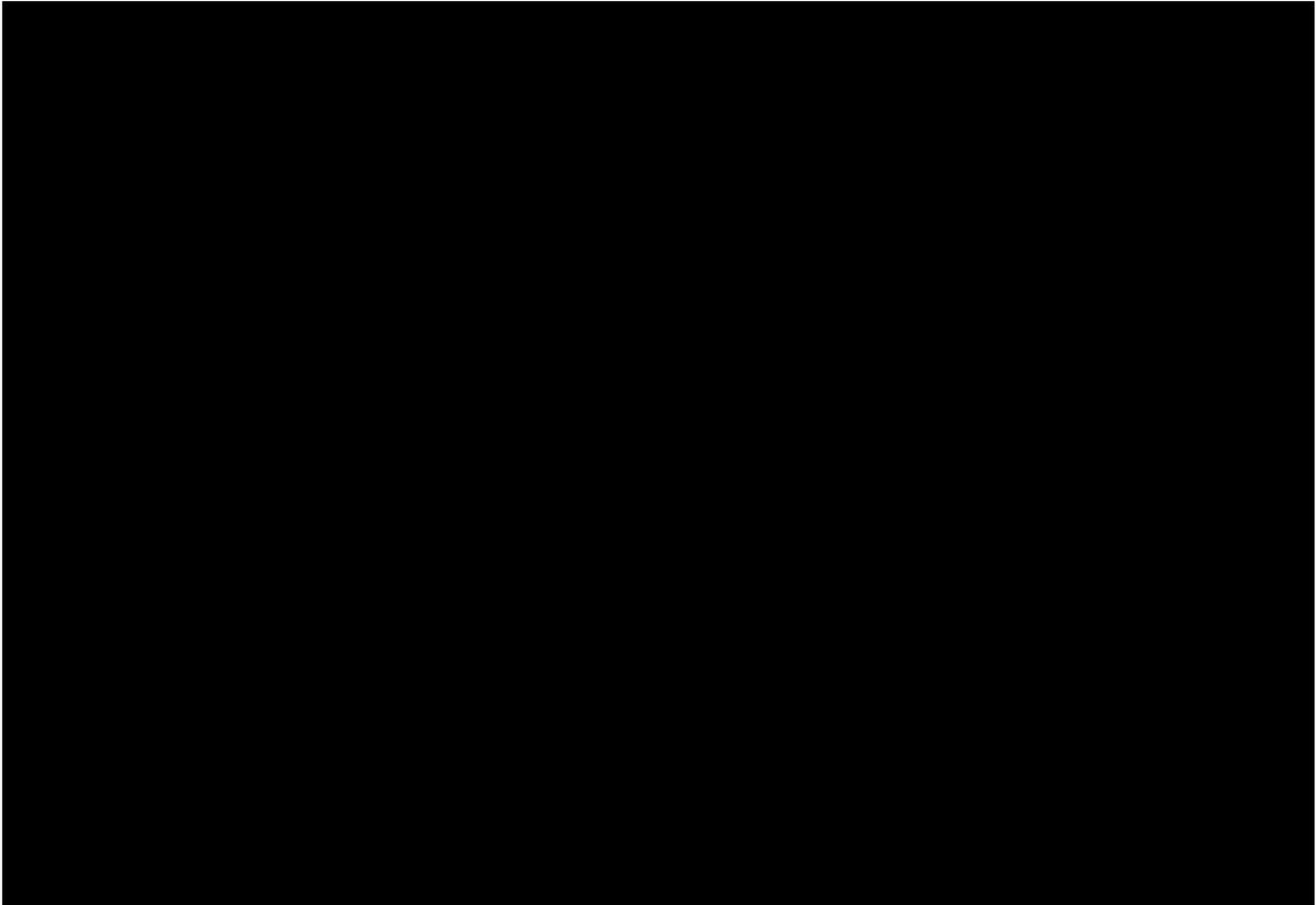
79. H. Wang and **Zhou XH\***. Quantile regression for estimating conditional means of health care costs . *Biometrika* 2010; 97: 147-158.
80. H. Z. Lin, D. P. Liu, and **Zhou XH\***. A correlated random-effects model for normal longitudinal data with nonignorable missingness. *Statistics in Medicine* 2010; 29:236-247.

**In Press**



**Submitted**



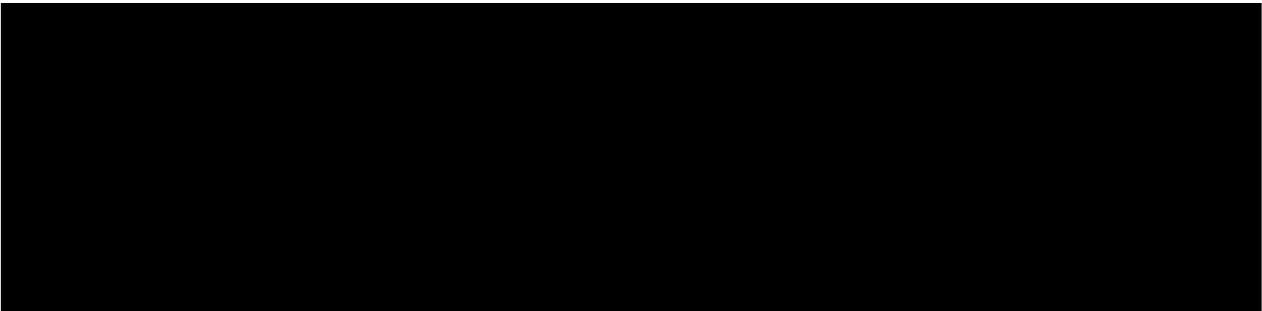


Medical Science

In press

1.

2.



2009

3. Luk, A. J., Levin, G. P., Moore, E. E., **Zhou, X.-H.**, Kestenbaum, B. R., & Choi, H. K. (2009). Allopurinol and mortality in hyperuricaemic patients. *Rheumatology*. 48 (7), 804-806.
4. Hedrick S. C., Guihan, M., Sullivan, J. H., **Zhou, X.H.**, Manheim, L. M., Forsberg, C. W., Mambourg, F. J. The Department of Veterans Affairs Assisted Living Pilot Program. *Journal of Aging and Health* 2009; vol 21: pp190-207.
5. Chapko, M. K., Manheim, L. M., Guihan, M., Sullivan, J. H., Zhou, X.H., Wang L., Mambourg, F. J., Hedrick, S. C. Assisted Living Pilot Program: Utilization and Cost Finding. *Journal of Aging and Health* 2009; Vol. 21; pp 208-225.
6. Estes A., Munson, J., Koehler, E., **Zhou, X. H.**, and Abbott, R. D. Parenting stress and psychological functioning among mothers of preschool children with autism and developmental delay *Autism*. *Autism* 2009; Vol 13: pp 375-387.

#### 2008

7. Koepsell TD, Kurland BF, **Zhou XH**, Harel O, and Kukull, WA. Education, cognitive function, and severity of neuropathology in Alzheimer's disease. *Neurology* 2008 May 6; 70: 1732-1739.
8. Koepsell TD, Kurland BF, **Zhou XH**, Harel O, and Kukull, WA. Education, cognitive function, and severity of neuropathology in Alzheimer's disease. *Neurology* 2008 May 6; 70: 1732-1739
9. Xi LF, Kiviat NB, Galloway DA, **Zhou XH**, Ho J, Koutsky LA. Effect of cervical cytologic status on the association between human papillomavirus type 16 DNA load and the risk of cervical intraepithelial neoplasia grade 3. *The Journal Of Infectious Diseases* 2008 Aug 1; Vol. 198 (3), pp. 324-31.
10. Munson J, Daswon G, Sterling L, Beauchaine T, **Zhou XH**, Koehler E, Lord C, Rogers S, Sigman M, Estes A, and Abbott R. Evidence for latent classes of IQ in young children with autism spectrum disorder. *American Journal on Mental Retardation* 2008 Nov; Vol 113, pp. 439-452.

#### 2007

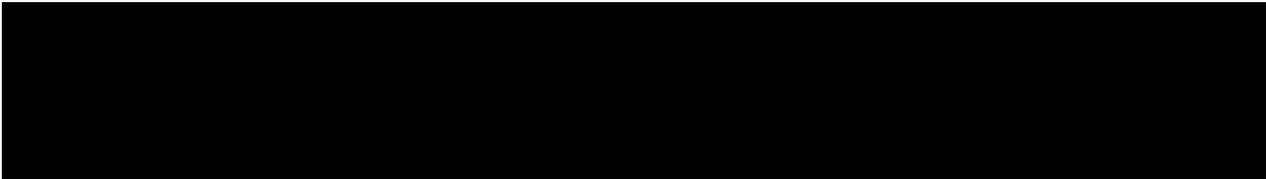
11. Koepsell TD, Chi YY, **Zhou XH**, Lee WW, Ramos EM, Kukull WA. An alternative method for estimating efficacy of the AN1792 vaccine for Alzheimer disease. *Neurology* 2007 69(19):1868-72

12. Hedrick, S, Chapko, M., Manheim, L., Sullivan, J., Thomas, M., Barry, S., and **Zhou, A.** Characteristics of residents and providers in the assisted living pilot program. *Gerontologist* 2007; 47:365-377.

**2005**

13. Tierney WM, Overhage JM, Murray MD, Harris LE, **Zhou XH**, Eckert GJ, Smith FE, Nienaber N, McDonald CJ, and Wolinsky FD. Can computer-generated evidence-based care suggestions enhance evidence-based management of asthma and chronic obstructive pulmonary disease? A randomized, controlled trial. *Health Serv Res.* 2005;40:477-98.
14. McFall M, Saxon AT, Thompson CE, Yoshimoto D, Malte C, Strats-Trster K, Kanter E, **Zhou XH**, Dougherty CM, Steele B. Improving the rates of quitting smoking for Veterans with posttraumatic stress disorder. *Am J Psychiatry.* 2005;162:1311-9.
15. Duncan GE, Li SM, and **Zhou XH**. Age and kidney function are the primary correlates of fasting plasma total homocysteine levels in non-diabetic and diabetic adults. Results from the 1999-2002 National Health and Nutrition Examination Survey. *Nutr Metab;* 26;2:13.
16. Katon , WJ, Schoenbaum M, Fan MY, Callahan CM, Williams J, Hunkeler F, Harpole L, **Zhou XH**, Langston C, and Unutzer J. Cost-effectiveness of improving primary care treatment of late-life depression. *Arch Gen Psychiatry.* 2005 Dec;62(12):1313-20.
17. Duncan GE, Li SM, and **Zhou XH**. Cardiovascular fitness among US adults: NHANES 1999-2000 and 2001-2002. *Medicine and Science in Sports and Exercise.* 2005; 37(8): 1324-8.

**2004**

18. Subramanian U., Fihn SD, Weinberger W., Plue L, Smith, F.E.,-Udris E., McDonell M,Eckert G. J., Temkit M., **Zhou X.H.**, Yeung A.,Chen L., and Tierney MD. A controlled trial of including symptom data in computer-based care suggestions for managing chronic heart failure. *American Journal of Medicine* 2004; 116: 375-384.
19. Murray MD, Harris LE, Overhage, **Zhou XH**, Eckert GJ, Smith FE, Buchanan NN, Wolinsky FD, McDonald CJ, Tierney WM . Failure of Computerized Treatment Suggestions to Improve the Health Outcomes of Outpatients with Uncomplicated Hypertension: Results of a Randomized Controlled Trial. *Pharmacotherapy* 2004: 324-337.
20. 
21. Duncan GE, Li SM, and **Zhou XH**. Prevalence and trends of a metabolic syndrome phenotype among u.s. Adolescents, 1999-2000. *Diabetes Care.* 2004;27:2438-43.

22. Burman M. L., Buchbinder M., Kivlahan D., Broglio K., **Zhou XH**, Merrill, J. O., McDonell, Fihn S. D., and Bradley K. Alcohol-related advice for Veterans Affairs primary care patients: Who gets it? Who gives it? *J Stud Alcohol*. 2004 ;65:621-30.
23. Bradley KA, Kivlahan DR, **Zhou XH**, Sporleder JL, Epler AJ, McCormick K, Merrill JO, McDonell MB, and Fihn SD. Using alcohol screening results and treatment history to assess the severity of at-risk drinking in Veterans Affairs primary care patients. *Alcohol Clin Exp Res*. 2004;28:448-55.

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49. Ferguson JA, Suelzer CJ, Eckert G, **Zhou XH**, Dittus RS. Risk factors for inpatient delirium tremens development. *J Gen Intern Med* 1996; 11:410-414.

1995

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51. Cavallo A, **Zhou XH**. LHRH test in the assessment of puberty in normal children. *Horm Res* 1994; 41:10-15.
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*b) Other refereed scholarly publications*

Not applicable

*c) Books and book chapters*

Medical Science

Swindle, R, Harris L, Kroenke, K, Tu, W, Zhou, X.H. (2001). Can mental health treatment be effectively delivered in primary care? A primer for employee benefit design, decision makers and an outcome research example. In I. Farquhar, K. Summers, and A. Sorkin (Eds.) Research in human capital and development (14, 343-375). The Netherlands: Elsevier Science Ltd.

Statistical Methodology

Morris C, Norton E, Zhou XH. Parametric duration analysis of nursing home data. (Book chapter) Case Studies in Biometry. Eds. Lange N, Billiard L, Brillinger D, Conquest L, Greenhouse J, Ryan L. Nicholas Lange and Louise Ryan eds. John Wiley & Son, Inc. 1994; 231-248.

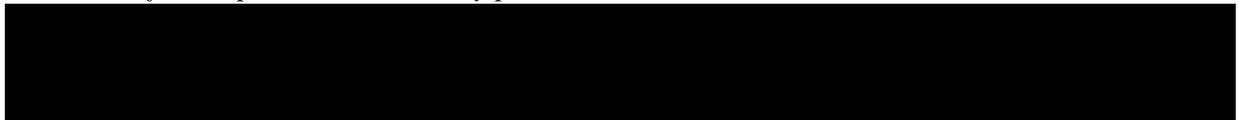
Textbooks

Zhou XH, Obuchowski NA and Obuchowski DM (2002). Statistical Methods in Diagnostic Medicine. First Edition. Wiley & Sons, New York, USA

Zhou XH, Obuchowski NA and Obuchowski DM (2010). Statistical Methods in Diagnostic Medicine. Second Edition. Wiley & Sons, New York, USA

*d) Other non-refereed published scholarly publications*

1.



2. M. Puri, and E. Waymire. Institute of Mathematical Statistics Lecture Notes-Monograph Series 2003; Volume 41: 169-186. Institute of Mathematical Statistics, Beachwood, CA.

**8. Patents and Other Intellectual Property**

Not applicable

**9. Funding History – Grants and Fellowships during past five years**

As *Principal Investigator* on Grants for *Statistical Methodology*

- 1) **U.S. Federal Government National Institute of Health (NIH) R29 (FIRST award)**, Solution for Verification Bias in Diagnostic Tests, 09/30/94 – 09/29/99, Principal Investigator, \$475,119.
- 2) **U.S. Federal Government Agency for Health Care Policy and Research (AHCPR) R03**, Comparing Mean Costs Before and After a Policy Change, 09/01/97 – 03/01/99, Principal Investigator, \$35,743.
- 3) **U.S. Federal Government NIH R01**, Methods for Analyzing Mental Care Expenditures, 09/01/98 – 05/30/01, Principal Investigator, \$286,770.

- 4) **U.S. Federal Government NIH R01**, Causal Analysis of Encouragement Design Studies, 09/30/2002 – 09/30/2006, Principal Investigator, \$661,500.
- 5) **U.S. Federal Government NIH R01**, Statistical Methods in Diagnostic Medicine, 07/1/2005 – 06/30/2008, Principal Investigator, \$540,000.
- 6) **U.S. Federal Government Agency for Healthcare Research and Quality (AHRQ) R01**, Regression Analysis of Health Care Costs, 09/30/2002 – 09/30/2006, Principal Investigator, \$476,000.
- 7) **U.S. Federal Government NIH R03**, Extension of Causal Inference - FIRCA, 12/01/2006 – 11/30/2010, Principal Investigator, \$100,000.
- 8) **U.S. Federal Government Department of Veterans Affairs**, New Statistical Methods for Analyzing Veterans' Health Care Costs, 12/01/2004 – 06/30/2007, Principal Investigator, \$340,340.
- 9) **U.S. Federal Government Department of Veterans Affairs**, Causal Inferences on Quality of Life with Deaths, 07/01/2007-12/30/2009, Principal Investigator, \$303,000
- 10) **U.S. National Science Foundation**, Empirical Likelihood Based Statistical Methods for Diagnostic Systems, 07/15/2006 – 06/30/2010, Principal Investigator, \$70,000.
- 11) **U.S. National Science Foundation**, Novel Semiparametric Two-part Models: New Theories and Applications, 07/1/2008 – 06/30/2011, Principal Investigator, \$105,000.
- 12) **U.S. Federal Government Department of Veterans Affairs**, Modeling of Health Care Costs of Veterans with Chronic Diseases, 10/01/2008 – 06/30/2011, Principal Investigator, \$501,364.
- 13) **U.S. Federal Government Department of Veterans Affairs**, Statistical Designs for Marker Validation Studies in Treatment Selection, 2/01/2009 – 01/30/2011, Principal Investigator, \$200,000.
- 14) **U.S. Federal Government NIH Challenge Grants in Health Sciences Research (RC1)**, Building Disease Prediction Models by Synthesis Analysis, 09/30/2009 – 08/29/2011, Principal Investigator, \$224,242.

*As Principal Investigator on Grants for Training*

- 15) U.S. Federal Government National Institute of Health (NIH) T32, Training Program on Biostatistics in Mental Health, 07/01/2007 – 06/30/2012, Director, \$636,287.

*As Statistician on Grants for Medical Sciences*

- 1) U.S. Federal Government Agency for Health Care Policy and Research (AHCPR), “Advance Directives, Proxies & Electronic Medical Records”, 4/1/1993-4/31/1997, (William M. Tierney, M.D., P.I.), Co-investigator, \$703,709.
- 2) U.S. Federal Government AHCPR, "Computer-Based Prospective Drug Utilization Review," 7/1/1993-12/31/1997, (William M. Tierney, M.D., P.I.), Co-investigator, \$1,043,874.
- 3) U.S. Federal Government Department of Veterans Affairs, an Integrated Model of Primary Care in Mental Health, 07/01/1997 – 06/30/2000, (Morris Weinberger, Ph.D., P.I.), Co-Investigator, \$583,634.

- 4) U.S. Federal Government Department of Veterans Affairs, Computerized Guidelines Enhanced by Symptoms and History: Clinical Effects, 07/01/1997 – 06/30/2000, (William M. Tierney, M.D., P.I.), Co-Investigator, \$621,941.
- 5) Eli Lilly & Company, Randomized clinical trial comparing selective serotonin reuptake inhibitors in the treatment of depression in primary care Investigator (Kurt Kroenke, PI), Co-Investigator, 07/01/1998 - 09/01/2000, [REDACTED]
- 6) U.S. Federal Government Department of Veterans Affairs, Evaluation of Community Based Outpatient Clinic Costs Using DSS Data, 10/1/2001 – 09/30/2004, (Matthew L. Maciejewski, Ph.D., P.I.), Co-Investigator, \$491,847.
- 7) U.S. Federal Government Department of Veterans Affairs, Evaluation of Assisted Living Pilot Program, 10/1/2001 – 09/30/2004, (Susan Hedrick, Ph.D., P.I.), Co-Investigator, \$873,654.
- 8) U.S. Federal Government Department of Veterans Affairs, Effects of Outlier Identification Strategy on Facility Profiling, 10/1/02 – 10/1/05, (Kevin Sloan, M.D., P.I.), Co-Investigator, \$745,029.
- 9) U.S. Federal Government National Institute of Health, University of Washington Autism Research Center of Excellence, 10/1/04- 9/30/2006, (Geraldine Dawson, Ph.D., P.I.), Co-investigator, \$5,000,000.
- 10) U.S. Federal Government National Institute of Health, National Alzheimer's Disease Coordinating Center, 10/1/05- 9/30/2015, (Walter Kukull, Ph.D., P.I.), Co-investigator, \$15,000,000.

## **10. Public Health Practice Activities**

Not applicable

## **11. Conferences and Symposiums**

### *Invited Talks*

1. March 23, 1997, ENAR of the International Biometric Society, Memphis, TN. Comparing accuracies of two diagnostic tests from a paired design study in the presence of verification bias.
2. November 5, 1997, the Department of Statistics, Harvard University, Cambridge, MA. Statistical methods for evaluating accuracies of diagnostic tests in the presence of verification bias.
3. August 10, 1998, ASA joint statistical meetings, Dallas, Texas. Statistical methods for evaluating accuracies of diagnostic tests in the presence of non-ignorable verification bias.
4. November 29, 1998, the Department of Biostatistics, University of Michigan, Ann Arbor, Michigan. Comparing the relative accuracies of two diagnostic tests in the presence of non-ignorable verification bias.
5. December 22, 1998, Chongqing University of Medical Science, Chongqing, China. Some New Developments in Biostatistics.

6. December 25, 1998, Sichuan Union University, Chengdu, China. Some New Developments in Biostatistics.
7. January 6, 1999, Beijing University, Beijing, China. Some New Developments in Biostatistics.
8. October 7, 1999, the Department of Statistics, Ohio State University, Columbus, OH. Assessing the accuracy of diagnostic tests in the presence of non-ignorable verification bias.
9. November 4, 1999, the Department of Mathematics, Indiana University, Bloomington, IN. Some improving confidence intervals for binomial proportions.
10. November 17, 1999, the Department of Biostatistics and Epidemiology, University of Pennsylvania, Philadelphia, PA. Assessing the relative accuracies of two diagnostic tests in the presence of non-ignorable verification bias.
11. February 28, 2000, Centre for Mathematics and Its Application, the Australian National University, Canberra, Australia. Assessing the relative accuracies of two diagnostic tests in the presence of non-ignorable verification bias.
12. July 3, 2000, International Biometric Conference, Berkeley, CA. Assessing the relative accuracies of two diagnostic tests in the presence of verification bias.
13. August 17, 2000, Joint Statistical Meetings, Indianapolis, IN. Analysis of cost data with zeros.
14. September 28, 2000, the Department of Biostatistics, Harvard University School of Public Health. Some New Statistical Methods for Analysis of Health Care Costs.
15. October 30, 2000, the Center for Statistical Science, Brown University. Analysis of Health Care Costs with additional zero values.
16. October 31, 2000, Division of Biostatistics, Yale University School of Medicine. Analysis of skewed populations with applications to health care costs.
17. November 16, 2000, the Department of Mathematics and Statistics, Boston University. Improving confidence intervals for binomial proportions.
18. November 28, 2000, the Department of Health Care Policy, Harvard Medical School. Analysis of health care costs in the presence of skewness, zeros and heteroscedasticity.
19. May 29, 2001, The Department of Primary and Ambulatory Care, Harvard Medical School. Statistical Methods for Analysis of Health Care Costs.
20. June 14, 2001, University of Washington. Kernel Smoothing of ROC Curves.

21. June 19, 2001, Mount Sinai School of Medicine. Statistical Methods for Evaluating Accuracies of Diagnostic Tests in the Presence of Verification Bias.
22. July 19, 2001, Department of Biostatistics. University of Michigan School of Public Health. New Statistical Methods for Analyses of Health Care Costs.
23. October 3, 2001, Division of Biostatistics. Washington University in St. Louis. Statistical Methods for Evaluating Accuracies of Diagnostic Tests in the Presence of Non-Ignorable Verification Bias.
24. November 13, 2001, Division of Biostatistics. Medical College of Wisconsin. Methods for Evaluating Accuracies of Diagnostic Tests in the Presence of Verification Bias.
25. March 20, 2002, Eastern North American Region of International Biometrical Society, Washington DC. New Statistical Methods for Analyses of Health Care Costs.
26. April 15, 2002, Department of Biostatistics UCLA School of Public Health. Improved Confidence Intervals for the sensitivity of a continuous-scale test at a fixed level of specificity.
27. August 15, 2002, Annual Statistical Meeting of American Statistical Association, New York City, NY. Improved Confidence Intervals for the sensitivity of a continuous-scale test at a fixed level of specificity.
28. January 6, 2003, Department of Mathematics, Sichuan University, Chengdu, China. Nonparametric estimation of component distributions in a multivariate mixture with an application to ROC curves.
29. January 7, 2003, Department of Preventive Medicine, Chongqing University of Medical Sciences, Chongqing, China. Some New Developments in Biostatistics.
30. January 9, 2003, Chinese Academy of Science, Beijing, China. Nonparametric estimation of component distributions in a multivariate mixture with an application to ROC curves.
31. April 2, 2003, International Biometric Society- ENAR, Tampa, FL. Meta-analysis of coarsely classified diagnostic data on polygraph testing.
32. October 17, 2003, International Conference on Health Policy Research, Chicago, IL. The impact of Case-mix Adjustment Methodology on Outlier Identification.
33. November 20, 2003, Department of Biostatistics, University of Washington, Seattle, WA. Nonparametric estimation in a multivariate mixture problem with an application to an ROC curve analysis.
34. April 16, 2004, Department of Statistics, University of British Columbia, Vancouver, Canada. Regression Models for Skewed Health Care Costs
35. June 28, 2004, Department of Mathematics, Sichuan University, Chengdu, China. Causal Inference for Randomized Encouragement Design Studies with Missing-Data.

36. June 28, 2004, Department of Biostatistics, School of Public Health, Sichuan University, Chengdu, China. Regression Models for Skewed Health Care Costs.
37. June 29, 2004, Department of Preventive Medicine, Chongqing University of Medical Sciences, Chongqing, China. Causal Inference for Randomized Encouragement Design Studies with Missing-Data.
38. July 6, 2004, Chinese Academy of Science, Beijing, China. Causal Inference for Randomized Encouragement Design Studies with Missing-Data. .
39. July 7, 2004, Guanghua Management School, Beijing University, Beijing, China. Regression Models for Skewed Health Care Costs
40. September 30, 2004, Department of Biostatistics, Columbia University School of Public Health, New York. Semi-parametric Regression Models for Censored Cost Data.
41. March 21, 2005, Eastern North American Region of International Biometrical Society, Austin, TX. Tips for handling good data with bad properties.
42. May 27, 2005, Division of Biostatistics, Washington University, St. Louis, Missouri. Two-part Regression Models for Skewed Health Care Costs.
43. June 22, 2005. Western North American Region of International Biometrical Society, Fairbanks, Alaska. Estimating the Retransformed Mean in a heteroscedastic Two-Part Model.
44. June 27, 2005. Estimating the causal effect of flu shot for influenza in an encouragement design study. Department of Statistics and Probability, Beijing University, Beijing.
45. June 28, 2005. Inferences in censored cost regression models with empirical likelihood. Chinese Academy of Science, Beijing.
46. July 3, 2005. Statistical methods in diagnostic medicine. Zhengzhou University School of Public Health, Zhengzhou, China.
47. July 5, 2005. Case-mix adjusted facility profiling in the VA health care system. Guanghua School of Management, Beijing University, Beijing, China.
48. July 15, 2005. Statistical methods for analysis of missing data. School of Public Health, Sichuan University, Chengdu, China
49. October 28, 2005. Nonparametric method for predicting health care costs with heteroscedasticity in risk-adjustment models. 6<sup>th</sup> International Conference on Health Policy Research. Boston, MA
50. November 28, 2005. Semi-parametric maximum likelihood estimation of ROC curves. Department of Epidemiology and Biostatistics, University of California, San Francisco, San Francisco, CA
51. August 7, 2005. A Marginal model approach for analysis of multi-reader multi-test receiver operating characteristic (ROC) data. 2005 Joint Statistical Meetings. Minneapolis, MN

52. January 27, 2006. Double semiparametric ROC regression models. Department of Biostatistics and Applied Mathematics, M.D. Anderson Cancer Center, University of Texas, Houston
53. March 29, 2006. Optimal estimation of ROC curves of continuous-scale tests. International Biometric Society Eastern Northern American Region, Tampa, FL.
54. April 20, 2006. Nonparametric transformation models with heteroscedastic variance. School of Statistics, University of Minnesota, Minneapolis, MN
55. July 7, 2006. New statistical methods in diagnostic medicine. International Conference on Frontiers of Statistics -Biostatistics and Bioinformatics, Changchun , China
56. July 9, 2006. New statistical methods in health economics. International Conference on Design of Experiments and Its Applications. Tianjin, China
57. September 14, 2006. Nonparametric transformation regression models for skewed data with heteroscedastic variance. Department of Statistics and Actural Sciences, University of Waterloo, Canada
58. March 20, 2007. A new non-parametric method for predicting health care costs with Heteroscedasticity. Department of Biostatistics, University of North Carolina at Chapel Hills, Chapel Hills, North Carolina.
59. March 21, 2007. Non-parametric group sequential designs in diagnostic medicine. Department of Biostatistics, Duke University, Durham, North Carolina.
60. March 22, 2007. Non-parametric analysis of skewed data with heteroscedasticity. Department of Biostatistics, University of Michigan.
61. Oct. 4, 2007. Double-Semiparametric ROC Regression Analysis. Department of Statistics, George Mason University, Fairfax, Virginia.
62. Oct 5, 2007. Direct semiparametric ROC regression models with unknown link and baseline functions. National Institute of Health, Bethesda, MD.
62. March 24, 2008. Causal Inferences in Randomized Clinical Trials for Multi-component Interventions. Stanford University, Stanford, CA
63. June 30, 2008. Non-parametric heroscedastic transformation regression models for skewed data with an application to prediction of future health care costs. Fudan University, Shanghai, China.
64. July 1, 2008. Identifiability and Estimation of Causal Effects in Randomized Trials with Noncompliance and Completely Non-ignorable Missing Data. The first international symposium on biopharmaceutical statistics. Shanghai, China
65. July 1, 2008. The Efficiency of Clinical Trial Designs for Predictive Biomarker Validation. The first international symposium on biopharmaceutical statistics. Shanghai, China.
66. July 4 , 2008. Selection and combination of biomarkers. Sichuan University, Chengdu, China.

67. July 7, 2008. Selection and combining biomarkers for disease prediction. Chongqing University of Medical Sciences, Chongqing, China.

68. August 5, 2008. A semi-parametric two-part mixed-effects model for longitudinal skewed semi-continuous data. Joint Statistical Meetings. Denver, TX, USA

69. Oct 6, 2008. Non-parametric heteroscedastic transformation regression models for skewed data with an application to prediction of future health care costs. College of Public Health, Ohio State University, Columbus, OH.

70. Nov 3, 2008. Development of biomarkers: from exploration to qualification of clinical utility for therapeutics. FDA Center for Drug Evaluation and Research Visiting Professor Lecture Series. Silver Spring, MD.

71. December 1, 2008. Evaluation of Prognostic Accuracy of Biomarkers. Mayo Clinic, Rochester, MN.

72. December 23, 2008. Evaluation of Prognostic Accuracy of Biomarkers, Peking University, Peking, China.

## 12. University Service

### *Indiana University (1993 - 2002)*

1996 - 1997 Member, Statistics-Subcommittee, Committee on Medical Student Curriculum, Indiana University School of Medicine

1997 - 2002 Member, Admission Committee, Department of Public Health, Indiana University School of Medicine

### *University of Washington (2003 - present)*

2003 - 2004 Member, Ad Hoc Faculty Informal Seminar, Department of Biostatistics, University of Washington

2004- 2005 Member, Ad Hoc Student Informal Seminar, Department of Biostatistics, University of Washington

2005 - 2006 Member, Admission Committee, Department of Biostatistics, University of Washington

2005- 2006 Chair, Postdoctoral Fellow/Visitor Committee, Department of Biostatistics, University of Washington

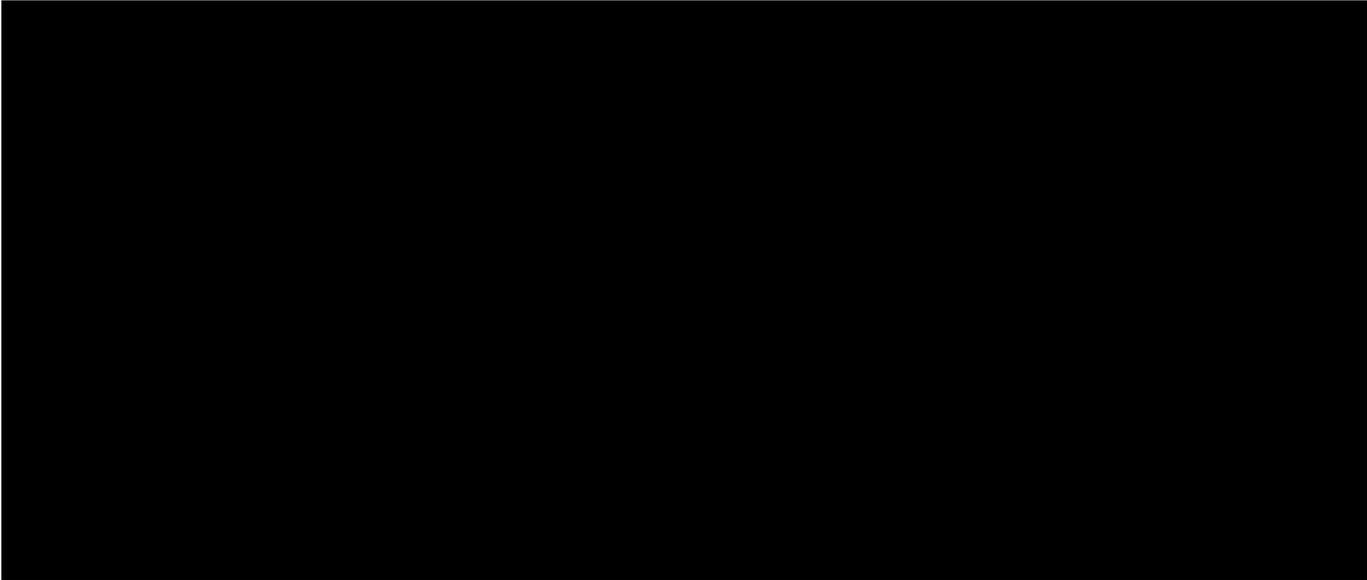
2006- Chair, Alumni Relation Committee, Department of Biostatistics, University of Washington

## 13. Ph.D and Master's Student Advisees and Postdoctoral Fellows:

a) Past Graduate Students As Dissertation Chair:

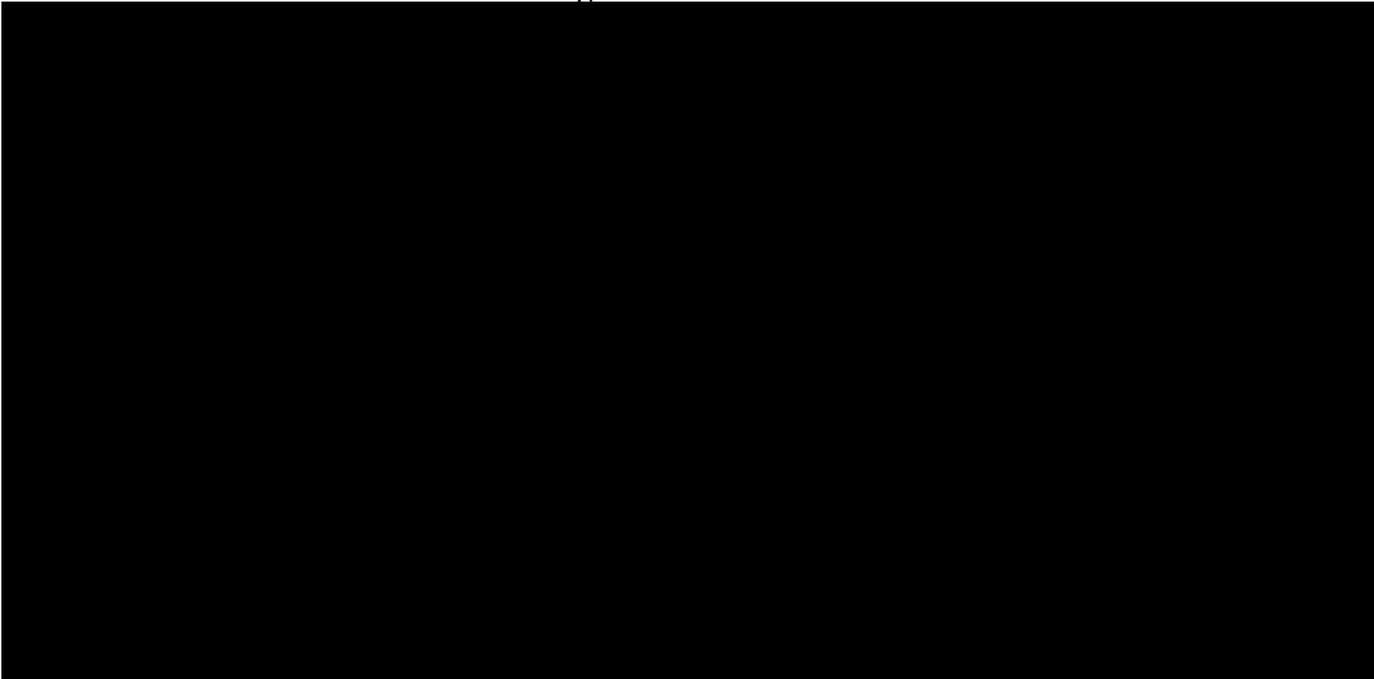
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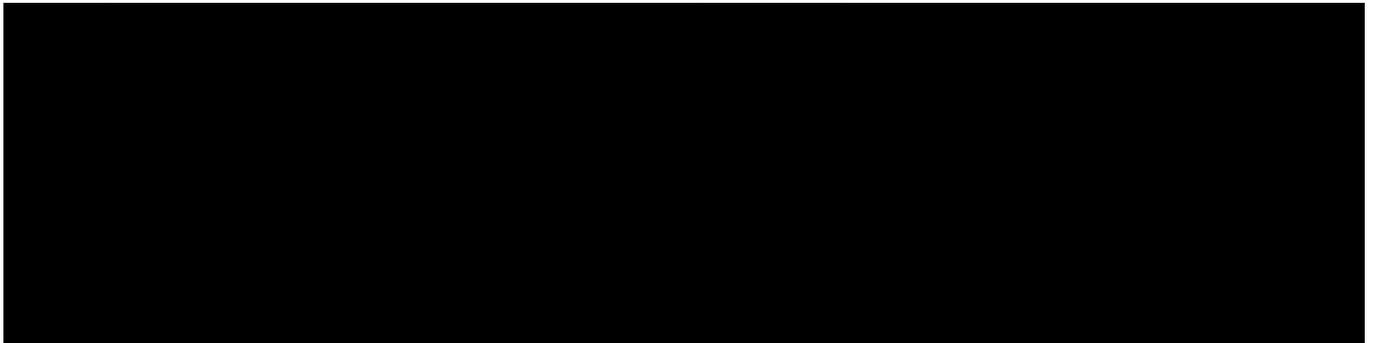
b) Past Post-doctoral Fellows As Mentor and Advisor:

<b>Name</b>	<b>Year</b>	<b>Degree</b>	<b>Current Position</b>
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c) Past Visiting Scholars As Mentor:

<b>Name</b>	<b>Year</b>	<b>Current Position</b>
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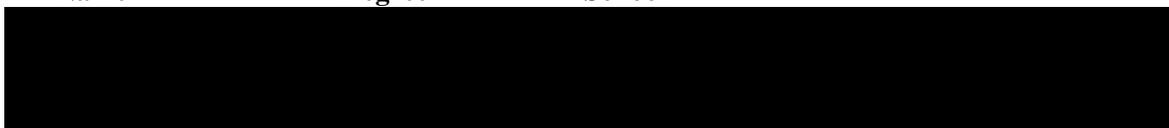
d) Current Graduate Students as Dissertation Chair:

Name	Degree	School
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d) Current Post-doctoral Fellows Mentor:

Name	Degree	School
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**14. Courses Taught**

a) Indiana University (1993-2002)

G652 Biostatistics

Biostatistics for Physicians: A Short Course

b) University of Washington (2002-present)

578C Statistical Analysis of Missing Data (Winter, 2005)

578C Statistical Analysis of Missing Data in Epidemiology (Winter 2006)

578A Measurement, Design, and Analysis in Behavioral or Mental Health (Winter 2007)

578A Statistical Analysis of Missing Data (Spring 2008)

578A Measurement, Design, and Analysis in Behavioral or Mental Health (Spring 2009)

**Area of Excellence**

Research – Diagnostic Medicine, ROC Methodology, Categorical Data Analysis, Health Services Research, Analysis of Skewed Data, Causal Inferences, Analysis of Observational Studies, Propensity-score Methodology, and Analysis of Missing Data, Evaluation of Biomarkers