

SHAWN GARBETT
Assistant in VUMC Biostatistics
2525 West End Ave #1100, Nashville, TN 37203
615.397.8737 December 12, 2024

EDUCATION

B.S. Electrical & Computer Engineering <i>Tulane University, New Orleans, LA</i>	<i>Aug 1990</i>
M.S. Applied Statistics <i>The Pennsylvania State University, University Park, PA</i>	<i>Dec 2014</i>

ACADEMIC APPOINTMENTS

Assistant in Biostatistics, Vanderbilt University Medical Center Leading Data Science efforts in Vanderbilt University Medical Center Biostatistics.	<i>Dec 2019–present</i>
Director of Informatics Software Development, VUMC Management of software development staff for Biostatistics.	<i>Jan 2021–present</i>

PROFESSIONAL ACTIVITIES

Intramural

Biostatistics Retreat Planning Committee	<i>2018</i>
Biostatistics Strategic Directions Committee	<i>2019–2020</i>
Biostatistics Resource Allocation Committee	<i>2020–present</i>
Biostatistics Chairperson of IT Staff Search Committee	<i>2021–present</i>
Biostatistics Staff Promotions Committee	<i>2021–2022</i>
Biostatistics IT Staff Promotions Committee	<i>2022–present</i>

Extramural

Journal of Theoretical Biology, Ad Hoc Reviewer.	<i>2010</i>
Borders, Trade and Immigration Institute (BTI) External Grant Reviewer.	<i>2016</i>
Springer Nonlinear Dynamics, Ad Hoc Reviewer.	<i>2018</i>
Modeler for State of Tennessee COVID-19 forecasting.	<i>2020</i>
UseR! 2022 Conference Organizer Committee.	<i>2021–2022</i>
Consultant on Committee for Recommending User Security Practices for REDCap.	<i>2021</i>
Co-chair, Program Book and Website Committee, International Chinese Statistical Association Applied Statistics Symposium.	<i>2023–2024</i>

Professional Organizations

Member of Society for Medical Decision Making.

Member of International Biometric Society

Member of American Statistical Association

Other Professional Activities

Student Researcher, *Tulane University Chemistry Department* *Sep 1987–Apr 1988*

Developed vector visualization of spin state changes in nuclear magnetic resonance given different electromagnetic pulse sequences.

Student Researcher, *Tulane University Computer Science Department* *Sep 1988–Apr 1989*

Part of team developing automated analysis of English specifications using formal parser theory under an NSF research grant.

Engineer in Training, *Tennessee Valley Authority* *Jan 1990–Dec 1994*

Developer first real time heat rate monitoring system for linear optimization of coal burning efficiency. System currently saves TVA tens of millions of dollars a year in coal expenses. Worked on linear program model of the Tennessee Valley reservoir system.

Programmer Analyst, *Machine View Inc* *Dec 1994–Sep 1995*

Researched and developed a multi-threaded embedded system in C to control a 1.1 megawatt diesel gen-set powered by a 16 cylinder diesel with load grid synchronization for the Army.

Staff Consultant, *Oracle* *Dec 1995–Sep 1996*

Researched and developed multidimensional indexing of spatial data for CON/ED in Brooklyn to track modifications to power transmission grid using Oracle and ARC/Info.

Programmer Analyst, *Computational Systems Inc.* *Sep 1996–Aug 1999*

Researched and developed embedded computer to record engine vibration and electrical profiles (FFT / timeseries) for predictive preventative maintenance.

Senior Consultant, *Nexware Corporation* *Aug 1999–Aug 2001*

Designed 2-ton gantry control system for PET/SPECT imaging with active radiation using statebox theory. Completed risks and hazard analysis for FDA product acceptance.

Senior Consultant, *Wisdom Software* *Aug 2001–Jan 2004*

Developed for Walter Reed Army Institute of Research an infusion pump for battlefield medical aid. Delivered zero defect embedded software in C for the medical feedback device and performed risk analysis leading to first closed-loop medical device approval by the FDA. First unit installed in the oval office, next units sold to Air Force One.

Software Architect, *Centerstone* *Jan 2004–Jan 2006*

Researched and developed static code analysis tool in Haskell to manage 400,000 lines of undocumented PL/SQL. Responsible for maintenance and upgrade of a 24/7 web based mental health database with 1000+ users and 140,000 clients.

Vice President of Development, *Greatlodge* *Feb 2006–Feb 2007*

Managed 15 developers for state fishing and hunting license sales. System had 50TPS peaks running Perl and Ruby on Rails on an Oracle 10g grid. Responsible for ACH bank transfers.

Development Manager, *Centerstone* *Feb 2007–Dec 2008*

Manager of 5 developers for an electronic medical record system. Researched and developed analytical data warehouse for informing evidence based treatment using Oracle.

Health System Engineer, *Vanderbilt University Medical Center* *Jan 2009–Jan 2014*

Formulated statistical estimators for estimating rates of cellular division, death and quiescence from microscopy data. Optimized likelihood computation for strategic sampling with high exposure. Wrote routines using BLAS, and C interfacing with R. Derived the Heterogeneous Growth Model (HGM), to model cancer relapse in the absence of drug resistance mutations.

Director of Application Development, *Change Healthcare* *Jan 2014–Feb 2016*

Responsible for technical direction of a team of 17 developers for cost prediction of medical services. Scaled application from 750k users to 9M.

Senior Application Developer, *VUMC Biostatistics* *Mar 2016–Dec 2019*

Leading reproducible research efforts in biostatistics department. Math modeling (time-delay differentials, discrete event simulations, Markov models) for evaluation of Health Policy in the presence of genomic information. Data curator for All Of Us project.

Awards

Author of one of ten key papers in Genomics, see “*Genomic Medicine Year in Review: 2021*”. The American Journal of Human Genetics 108(12), 2210-2214, 2021.

Department IT Innovation Award for Biostatistics Reporting Server (BRS) (2021)

Author of one of ten key papers in Genomics, see “*Genomic Medicine Year in Review: 2022*”. The American Journal of Human Genetics 109, 2101-2104, 2022.

Author of one of ten key papers in Genomics, see “*Genomic Medicine Year in Review: 2023*”. The American Journal of Human Genetics 110(12), 1992-1995, 2023.

Department IT Innovation Award (2023)

TEACHING ACTIVITIES

Guest Lecturer, *Mathematics of Growth and Motility Processes*. *2011–2013*
Cancer Systems Biology CAN347, Professor Lourdes Estrada, Vanderbilt University.

Lecturer, *R and RStudio Workshop*, RMS Short Course, Vanderbilt *May 2019*

Assistant Course Director, CPBP 8329-01 Introduction to Data Science and Statistics *Fall 2020*
Developed syllabus, lectures, assignments and quizzes for 2 credits in Vanderbilt University’s Chemical and Physical Biology Graduate Program.

Lecturer, *R and RStudio Workshop*, RMS Short Course, Vanderbilt *May 2020*

Lecturer, *Short Introduction to R*, CDC RMS Workshop, Vanderbilt *Sep 2021*

Lecturer, *R and RStudio Workshop*, RMS Short Course, Vanderbilt *May 2022*

Instructor, *What They Didn't Teach You About Decision Making*, SMDM 18th Biennial European Conference, Short Course, Berlin May 2023

Instructor, *Introduction to SQL*, Biostatistics Summer Institute Jul 2024

RESEARCH SUPERVISION

Sarah Fletcher Mercaldo, undergraduatel 2010
Now Co-chair of Statistics, Department of Radiology Massachusetts General Hospital

Oscar Ortega, undergraduate 2012
Now Principal Scientist at Novartis

Sam Hooke, undergraduate student. 2012
Now Reporting Engineer at Epic

Bailu Yan, graduate student Jan 2024-present

RESEARCH PROGRAM

Ongoing Research

Advancing Treatment Outcomes for Pregnant Women with Opioid Use Disorder
Numerical Analyst (5% FTE) Apr 2020-present
NIH K01-DA050740 (Ashley Leech) Vanderbilt University Medical Center (\$860,388)

Rational Integration of Polygenic Risk Scores (RIPS)
Numerical Analyst (15% FTE) Jul 2022-present
NIH R01HG012262 (Joseph Peterson) Vanderbilt University Medical Center (\$2,858,432)

Harnessing big data to arrest the HIV/HCV/opioid syndemic in the rural and urban South
Biostatistician (10% FTE) Jan 2024-present
NIDA 1R01DA057129-01A1 (Peter Rebeiro) Vanderbilt University Medical Center (\$743,750)

Outcome Dependent Sampling of Longitudinal Data: Design and Analysis
Software Engineer (15% FTE) Jan 2024-present
NHLBI 5R01HL094786 (Jonathan Schildcrout) Vanderbilt University Medical Center (\$4,741,451)

Completed Research

Image Driven Multi-Scale Modeling to Predict Treatment Response in Breast Cancer
Biostatistician (20% FTE) 2011-2013
NIH U01CA174706 (Thomas Yankeelov) Vanderbilt University (\$2,528,200)

Outcome Dependent Sampling of Longitudinal Data: Design and Analysis
Software Engineer (20% FTE) 2011-2012
NHLBI 5R01HL094786 (Jonathan Schildcrout) Vanderbilt University Medical Center (\$4,741,451)

Studies of Receptor Mediated Signal Transduction Processes in Mammalian Cancer
Numerical Analyst (50% FTE) 2013-2014

NIH K22CA151918 (Carlos Lopez) Vanderbilt University (\$395,844)

Cancer Center Support Grant
Biostatistician(20% FTE) 2013–2014

NCI 5P30CA068485 (Jennifer Pietenpol) Vanderbilt University Medical Center(\$158,926,733)

Multiscale Mathematical Modeling of Cancer Progression
Numerical Analyst (50% FTE) Jan 2009–Jan 2014

NCI U54CA113007 (Vito Quaranta) Vanderbilt University Medical Center (\$19,193,051)

Rational Integration of Genomic Healthcare Testing
Numerical Analyst (25% FTE) Jul 2016–Jul 2018

NIH U01HL122904 (Joseph Peterson) Vanderbilt University Medical Center (\$1,905,512)

Rational Integration of Clinical Sequencing
Numerical Analyst (25% FTE) Jul 2018–Jul 2022

NIH R01HG009694 (Joseph Peterson) Vanderbilt University Medical Center (\$3,408,961)

Data and Research Support Center
Biostatistician (25% FTE) Jul 2019–Jul 2024

NIH U2COD023196 (Joshua Denny) Vanderbilt University Medical Center (\$143,721,067)

Single-Center Long-Term Outcomes of Conventional Lipiodol Chemoembolization of
Hepatocellular Carcinoma
Biostatistician (5% FTE) Jul 2020–Dec 2022

Private Grant from Guerbert (Daniel Brown) Vanderbilt University Medical Center

CODA: COvid-19 and Diabetes Assessment Informatics Director (10% FTE) Jan 2024–Nov 2024

NIDDK 5U01DK137533-02 (Russell Rothman) Vanderbilt University Medical Center (\$14,508,027)

PUBLICATIONS AND PRESENTATIONS

Publications

Shawn Garbett. “**Cross Platform CD Indexing**,” in *Linux Journal*. December 2003.

Shawn Garbett. “**Cleanroom Software Engineering**,” in *Dr. Dobbs*. August 2003.

Quaranta V, Tyson DR, Garbett SP, Weidow B, Harris MP, Georgescu W. “**Trait variability of cancer cells quantified by high-content automated microscopy of single cells**,” in *Methods in Enzymology*. 2009;467:23-57. doi: 10.1016/S0076-6879(09)67002-6.

Quaranta V, Garbett SP. “**Not all noise is waste**,” in *Nature Methods*. 2010 Apr;7(4):269-72. doi: 10.1038/nmeth0410-269.

Hassanein M, Weidow B, Koehler E, Bakane N, Garbett S, Shyr Y, Quaranta V. “**Development of high-throughput quantitative assays for glucose uptake in cancer cell lines**,” in *Molecular Imaging and Biology* 2011 Oct;13(5):840-52. doi: 10.1007/s11307-010-0399-5.

Gabriel P, Garbett SP, Quaranta V, Tyson DR, Webb GF. “**The contribution of age structure to cell population responses to targeted therapeutics**,” in *Journal Theoretical Biology*. 2012 Oct 21;311:19-27. doi: 10.1016/j.jtbi.2012.07.001.

Tyson DR, Garbett SP, Frick PL, Quaranta V. “**Fractional proliferation: a method to deconvolve**

cell population dynamics from single-cell data,” in *Nature Methods*. 2012 Sep;9(9):923-8. doi: 10.1038/nmeth.2138.

Schildcrout JS, Garbett SP, Heagerty PJ. “**Outcome Vector Dependent Sampling with Longitudinal Continuous Response Data: Stratified Sampling Based on Summary Statistics,**” in *Biometrics*. 2013 Feb 14. doi: 10.1111/biom.12013.

Markov DA, Little EM, Garbett SP, McCawley LJ. “**Variation in diffusion of gases through PDMS due to plasma surface treatment and storage conditions,**” in *Biomed Microdevices*. 2014 Feb;16(1):91-6. doi: 10.1007/s10544-013-9808-2.

Schildcrout JS, Rathouz PJ, Zelnick LR, Garbett SP, Heagerty PJ. “**Biased Sampling Designs to Improve Research Efficiency: Factors Influencing Pulmonary Function over Time in Children With Asthma,**” in *Ann Appl Stat*. 2015 Jun;9(2):731-753. PMID: 26322147

Harris LA, Frick PL, Garbett SP, Hardeman KN, Paudel BB, Lopez CF, Quaranta V, Tyson DR. “**An unbiased metric of antiproliferative drug effect in vitro,**” in *Nat Methods*. 2016 Jun; 13(6):497-500. doi: 10.1038/nmeth.3852

Schildcrout JS, Haneuse S, Tao R, Zelnick LR, Schisterman EF, Garbett SP, Mercaldo ND, Rathouz PJ, Heagerty PJ. “**Two-phase, generalized case-control designs for quantitative longitudinal outcomes.**” in *Am J Epidemiol*. 2019 Jun 5. pii: kwz127. doi: 10.1093/aje/kwz127.

Graves JA, Zilu Z, Garbett SP, Peterson J. “**The Value of Pharmacogenomic Information**” in *Economic Dimensions of Personalized and Precision Medicine*. National Bureau of Economic Research. University of Chicago Press. 2019. Chapter 3.

Shi Y, Graves JA, Garbett SP, Zhou Z, Marathi R, Wang X, Harrell FE, Lasko TA, Denny JC, Roden DM, Peterson JF, Schildcrout JS. “**A Decision-Theoretic Approach to Panel-Based, Preemptive Genotyping**” in *MDM Policy Pract*. 2019 Aug 17;4(2). doi: 10.1177/2381468319864337.

Nita Limdi, L Cavallari, Craig Lee, William Hillegass, Ann Holmes, Todd Skaar, Maria Pisu, Chrisly Dillon, Amber Beitelshees, Philip Empey, Julio Duarte, Vakaramoko Diaby, Yan Gong, Julie Johnson, John Graves, Shawn Garbett, Zilu Zhou, and Josh Peterson. “**Cost-effectiveness of CYP2C19-guided antiplatelet therapy in patients with acute coronary syndrome and percutaneous coronary intervention informed by real-world data**” in *Pharmacogenomics*. 2020 Feb 11. doi:10.1038/s41397-020-0162-5.

Gregory F. Guzauskas, Shawn Garbett, Zilu Zhou, Scott J. Spencer, Hadley S. Smith, Jing Hao, Dina Hassen, Susan R. Snyder, John A. Graves, Josh F. Peterson, Marc S. Williams, David L. Veenstra. “**Cost-effectiveness of Population-Wide Genomic Screening for Hereditary Breast and Ovarian Cancer in the United States**” in *JAMA Netw Open*. 2020;3(10):e2022874. doi:10.1001/jamanetworkopen.2020.22874

Graves, John, Shawn Garbett, Zilu Zhou, Jonathan Schildcrout, Josh Peterson. “**Comparison of Decision Modeling Approaches for Health Technology and Policy Evaluation.**” in *Medical Decision Making*. 2021, March 18. doi:10.1177/0272989X21995805

Schildcrout, Jonathan S., Frank E. Harrell, Jr., Patrick J. Heagerty, Sebastien Haneuse, Chiara Di Gravio, Shawn Garbett, Paul J. Rathouz, Bryan E. Shepherd. “**Model-assisted analyses of longitudinal, ordinal outcomes with absorbing states**” in *Statistics in Medicine*. 2022. doi: 10.1002/sim.9366

Guzauskas GF, Jiang S, Garbett S, Zhou Z, Spencer SJ, Snyder SR, Graves JA, Williams MS, Hao J, Peterson JF, Veenstra DL. **“Cost-effectiveness of population-wide genomic screening for Lynch syndrome in the United States”**. *Genet Med*. 2022 May;24(5):1017-1026. doi: 10.1016/j.gim.2022.01.017. Epub 2022 Feb 25. PMID: 35227606; PMCID: PMC9673900.

Cheryl N. Miller, Keri N. Althoff, David J. Schlueter, Hoda Anton-Culver, Qingxia Chen, Shawn Garbett, Francis Ratsimbazafy, Isaac Thomsen, Elizabeth W. Karlson, Mine Cicek, Ligia A. Pinto, Bradley A. Malin, Lucila Ohno-Machado, Carolyn Williams, David Goldstein, Aymone Kouame, Andrea Ramirez, Kelly A. Gebo, Sheri D. Schully. **“Concordance of SARS-CoV-2 Antibody Results during a Period of Low Prevalence”** in *American Society for Microbiology*. 2022 Oct 26;7(5). doi: 10.1128/msphere.00257-22

Hund HC, Frantz SK, Wu H, Adeniran OR, Wong TY, Borgmann AJ, Matsuoka L, Geevarghese S, Alexopoulos S, Shingina A, Meranze SG, Baker JC, Garbett S, Brown DB. **“Six-Year Evaluation of Same-Day Discharge Following Conventional Chemoembolization of Hepatocellular Carcinoma”** *J Vasc Interv Radiol*. 2023 Mar;34(3):378-385. doi: 10.1016/j.jvir.2022.11.029.

Gregory F Guzauskas, Shawn Garbett, Zilu Zhou, Jonathan S Schildcrout, John A Graves, Marc S Williams, Jing Hao, Laney K Jones, Scott J Spencer, Shangqing Jiang, David L Veenstra, Josh F Peterson. **“Population Genomic Screening for Three Common Hereditary Conditions : A Cost-Effectiveness Analysis”** *Ann Intern Med*. 2023 May;176(5):585-595. doi: 10.7326/M22-0846.

Ortega OO, Ozen M, Wilson BA, Pino JC, Irvin MW, Ildefonso GV, Garbett SP, Lopez CF. **“Signal execution modes emerge in biochemical reaction networks calibrated to experimental data”**. *iScience*. 2024 May 16;27(6):109989. doi: 10.1016/j.isci.2024.109989. PMID: 38846004; PMCID: PMC11154230.

Guide A, Sulieman L, Garbett S, Cronin RM, Spotnitz M, Natarajan K, Carroll RJ, Harris P, Chen Q. **“Identifying erroneous height and weight values from adult electronic health records in the All of Us research program”**. *J Biomed Inform*. 2024 Jul;155:104660. doi: 10.1016/j.jbi.2024.104660. Epub 2024 May 23. PMID: 38788889.

Jiang S, Guzauskas GF, Garbett S, Graves JA, Williams MS, Hao J, Zhu J, Jarvik GP, Carlson JJ, Peterson JF, Veenstra DL. **“Cost-effectiveness of population-wide genomic screening for Lynch Syndrome and Polygenic Risk Scores to inform Colorectal Cancer screening”**. *Genet Med*. 2024 Sep 30:101285. doi: 10.1016/j.gim.2024.101285. PMID: 39360752.

Guide A, Garbett S, Feng X, Mapes BM, Cook J, Sulieman L, Cronin RM, Chen Q. **“Balancing efficacy and computational burden: weighted mean, multiple imputation, and inverse probability weighting methods for item non-response in reliable scales”**. *J Am Med Inform Assoc*. 2024 Aug 13:ocae217. doi: 10.1093/jamia/ocae217. PMID: 39138951

Presentations

Invited Speaker, *Building R Packages for Reproducible Research*
Statistical Practice in Cancer Conference, Moffitt

Mar 2017

Oral Presentation, *Cost Effectiveness Markov Model Bias and Correction* Annual Meeting of the
Society for Medical Decision Making, Montreal

Oct 2018

Contributor, *Six-Year Evaluation of Same-Day Discharge Following Conventional Transarterial Chemoembolization (cTACE) of Hepatocellular Carcinoma* Jun 11-16, 2022
Society of Interventional Radiology 47th Annual Scientific Meeting, Boston MA. Frantz S, Wu H, Adeniran O, Wong T, Borgmann A, Matsuoka L, Geevarghese S, Alexopoulos S, Shingina A, Meranze S, Baker J, Garbett S, Brown D.

Poster, *Preservation of non-linear correlation between birth outcomes calibrated to known marginals among infants affected by opioids*, Oct 23, 2022
Society for Medical Decision Making, Seattle, WA Meeting. Shawn Garbett, Elizabeth McNeer, Rashmi Bharadwaj, Stephen W. Patrick, Ashley A. Leech.

Poster, *Modeling the diffusion and impact of health technology uptake among family members: cascade genomic sequencing* Oct 25, 2022
Society for Medical Decision Making, Seattle WA Meeting. Shawn Garbett, John Graves, Gregory F Guzauskas, David Veenstra, Josh F Peterson.

Poster, *redcapAPI: Analysis-Ready Data Retrieval from REDCap with Advanced Processing Capabilities in R* Sep 29, 2023
Vanderbilt University Medical Center Biostatistics 20th Anniversary Symposium. Savannah Obregon, Cole Beck, Shawn Garbett

Poster, *Costs of Uncertainty: A Value of Information Analysis of Pregnant Individuals with Opioid Use Disorders* Oct 28, 2024
Society for Medical Decision Making, Boston MA Meeting. Ashley Leech, Hanxuan Yu, Elizabeth McNeer, Johan Graves, Benjamin Linas, Stephen Patrick, Natalia Kunst, Grace Ratcliff, Shawn Garbett.

PACKAGES

emg CRAN R Package. Creator 2010–present
Extend R programming language with statistical mixture of a normal and an exponential random variable.

fracprolif CRAN R Package. Creator 2010–present
Share microscopy data for cancer cell cycle with likelihood tools and tests for fitting distribution assumptions.

tangram CRAN R Package. Creator 2016–present
A package to create publication quality tables directly from R for reproducible research. Renders to text, LaTeX, RTF, and HTML5. Provides for automated definitions of variable summary tables definable by R formula, with the provided reference from Frank Harrell’s *Hmisc*. Output styles include Lancet and NEJM.

acepack CRAN R Package. Maintainer 2016–present
Two nonparametric methods for multiple regression transform selection are provided. The first, Alternative Conditional Expectations (ACE), is an algorithm to find the fixed point of maximal correlation, i.e. it finds a set of transformed response variables that maximizes R^2 using smoothing functions. Also included is the Additivity Variance Stabilization (AVAS) method which works better than ACE when correlation is low.

rccola CRAN R Package. Creator *2021–present*
RedCap CryptO Locker for Api keys. A package to make the best security practices for managing
api keys locally the easiest practice for R report generation. Now folded into redcapAPI.

yaml CRAN R Package. Maintainer *2022–present*
A key package to the entire R community with 700,000 downloads a month. Reads/write yaml files
with strong dependencies from RStudio and Rmarkdown.

redcapAPI CRAN R Package. Maintainer *2022–present*
An interface between REDCap and R in support of biostatistical research and clinical trials.

shelter CRAN R Package. Creator *2024–present*
Secure api key management replacement for rccola.