## BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES.**

NAME: Susan R. Snyder

eRA COMMONS USER NAME (credential, e.g., agency login): srsnyder1

POSITION TITLE: Associate Professor and Director, Health Economics Research and Evaluation Core

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | Completion Date MM/YYYY | FIELD OF STUDY |
|---|---|---|---|
| University of Pennsylvania, Wharton School, Philadelphia, PA | BS | 05/1983 | Economics |
| University of California, Haas School of Business, Berkeley, CA | MBA | 12/1987 | Finance |
| Georgia State University, Andrew Young School of Policy Studies, Atlanta, GA | PhD | 05/2001 | Economics (Healthcare and Labor) |
| Centers for Disease Control and Prevention (CDC) Prevention Effectiveness Post-Doctoral Fellowship, Atlanta, GA | | 07/2003 | |

### A. Personal Statement

I have more than 20 years of experience leading and conducting health services research including comparative effectiveness analyses, quality improvement studies, systematic reviews, economic evaluations and policy analyses of public health and healthcare interventions. This work involves generating and applying evidence, developing methods, and completing outcomes-based and performance evaluations of effectiveness, efficiency, and safety. My research spans diverse areas including population health, technology assessment, healthcare delivery models, quality measurement, financing and insurance. I've served in the capacity of Principal Investigator, Co-Investigator, Project Officer, Task Leader and Technical Consultant on projects supported by government, nonprofit, industry and internal funding sources. I joined Geisinger Health System's Center for Health Research as an Associate Professor in 2013, and developed its Health Economics Research and Evaluation (HERE) Core and serve as its Director. In my prior experience I was a Research Leader at Battelle's Center for Public Health Research and Evaluation preceded by ten years at the Centers for Disease Control and Prevention where I completed a post-doctoral program for economists following a position at the Georgia Health Policy Center as an Associate and Director of Reimbursement Studies while completing my PhD in Economics at Georgia State University. My last position at the CDC was Senior Economist and Team Lead of an Evidence-Based Laboratory Medicine program in the Division of Laboratory Science.

My research interests are focused on developing and applying evidence to optimize the impact of precision medicine and population health, including preventive services, to improve cost-effectiveness and health-related outcomes. A specific area of emphasis is economic evaluation of evidence-based risk-stratification interventions. This includes cancer screening, prevention, treatment and surveillance and pharmacogenomic applications. I am currently involved with multiple research initiatives involving the economics of genomic and biomarker testing applications, and other personalized medicine strategies to target populations most likely to benefit from healthcare services. I collaborate with research leaders on methods and issues as a member of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Personalized/Precision Medicine Special Interest Group by participating in its initiatives including manuscript development by its Assessing the Value Working Group for publication in *Value in Health*.

## B. Positions and Honors

Positions and Employment

1988-1990 Medical Economics Analyst, Kaiser Permanente, Headquarters Office, Oakland, CA

1990-1992 Associate, A. Foster Higgins & Company (now Mercer), Managed Care Practice, Atlanta, GA

1992-2000 Research Associate/Instructor (appointment preceded by various positions), Georgia State University, Atlanta, GA

- Georgia Health Policy Center, Andrew Young School of Policy Studies
  Research Associate/Reimbursement Studies Director (1995-2000)
- Urban Study Institute, Policy Research Center, Research Assistant (1995 -1996)
- Economics Department - Executive MBA Program, Teaching Assistant (1995)
- Center for Risk Management and Insurance, Business School
  Research and Teaching Assistant (1992-1994)

2001-2011 Team Lead and Senior Economist (appointment preceded by various positions), Centers for Disease Control and Prevention (CDC)

- Division of Prevention Research and Analytic Methods, Community Guide Branch and Prevention Effectiveness & Health Economics Branch, Health Economist (2001-2003)
- Division of Laboratory Science and Standards, Laboratory Research and Evaluation Branch (2003–2011)

2011-2013 Research Leader, Battelle Memorial Institute, Centers for Public Health Research and Evaluation, Atlanta, GA

2013-Present Associate Professor and Director, Health Economics Research and Evaluation Core, Geisinger Center for Health Research, Danville, PA

Professional Service and Honors

2001 MEDSTAT Marketscan Award for innovative and advanced health services research

2001-2003 CDC Prevention Effectiveness Post-Doctoral Fellowship – Certificate of Completion

2005-2006 National Quality Forum Advisory Committee on Evidence and Performance Measure Grading

2003-2008 CDC Epidemic Intelligence Service Prevention Effectiveness and Decision Analysis, facilitator

2005-2006 Exploring Accreditation - Research and Evaluation Workgroup, Member

2006-2008 American Medical Association's Physician Consortium for Performance Improvement's Pathology Measures Workgroup, Co-Chair

2008-2009 National Quality Forum (NQF) Patient Safety and Communication Practices for Laboratory Medicine Steering Committee, Technical Consultant

2009 Healthy People 2020 Genomics Topic Area Workgroup, Member

2010 CDC Best Practices Workgroup, Member

2011 CDC Ten Year Employee Service Award

2012 National Heart Failure Database Workgroup, Member

2013 Battelle Achievement Award – 2012 Best Scientific and Technical Team, Team Leader

2014-Present Cancer Research Network Head and Neck Cancer Scientific Interest Group

2015-Present International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Multi-Criteria Decision Analysis Task Force

2015-Present International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Personalized/Precision Medicine Special Interest Group

## C. Contribution to Science

**Economic Evaluation of Precision/Personalized Medicine**

Most recently I've been involved in research to develop evidence of the value of precision medicine, including genomic testing, as a basis for prevention and treatment to inform decision making. Economic evaluation has an important role in creating a more efficient healthcare system by contributing to directing patients toward beneficial therapies and away from therapies that pose substantial risk or are unlikely to improve outcomes. Modeling approaches offer comparative assessments of value inclusive of a chain of evidence and clinical and

economic outcomes for improving population health. To guide evidence development, I co-authored an article identifying important pharmacogenomic economic evidence gaps where research is likely to have a substantial impact on technology development and practice decisions. My current work includes industry-funded cost-effectiveness analyses of new biomarker tests, and two additional projects described below.

- Genomic Medicine Implementation: The Personalized Medicine Program (NIH/NHGRI: University of Florida); Role: Co-Investigator. The goal of the project is to develop, test and disseminate a generic decisionmaking tool based on a pharmacogenetic decision analysis cost-effectiveness simulation model for HLA-B*15:02 genetic testing prior to the use of carbamazepine in adult patients with epilepsy to prevent induced severe cutaneous adverse events (Stevens–Johnson Syndrome and Toxic Epidermal Necrolysis).
- Economic Outcomes of Genomic Return of Results to MyCode Participants (Geisinger Clinic Research Fund); Role: Principal Investigator. Geisinger's MyCode initiative is the first of its kind to return medically actionable genomic incidental findings for identification and management of pre-symptomatic patients for 76 genes related to 27 monogenic conditions identified by whole exome sequencing from at least 200,000 biobank participants. The project purpose is to develop healthcare utilization and cost estimates for three cohorts: all patients, Lynch Syndrome (colon cancer) and hereditary breast and ovarian cancer (BRCA1/2).


1. **Snyder SR**, Mitropoulou C, Patrinos GP, Williams MS. Economic evaluation of pharmacogenomics: a value-based approach to pragmatic decision making in the face of complexity. Public Health Genomics. 2014;17(5-6):256-64. PubMed PMID: 25278172
2. **Snyder SR**, Pitcavage JM, Block JA. A Real-World Approach to a Value-Based Decision-Making Framework for Genetic Testing. J Patient-Centered Res Rev. 2015;2:110-111.
3. Snyder SR, Leeming RL, Rahm A, Hao J, Geng Z. High Risk Breast Clinic: A New Risk-Stratified, Evidence-Based and Efficient Patient Care Model. Oral Presentation, Genetics, Genomics, and Precision Medicine: Health Care System Research Network 2016 Annual Conference.
4. Hao J, Snyder, SR, Pitcavage JM, Critchley-Thorne RJ. A Cost-Effectiveness Analysis of a Cancer Risk Prediction Test for Patients with Barrett's Esophagus. Gastroenterology. 2016; 150:3: S260-S261.


**Health Economics Research and Evaluation**

I am Director of the Health Economics Research and Evaluation (HERE) team of investigators and analysts in the Geisinger Center for Health Research. Geisinger Health System is a large integrated system with more than 1,000 physicians and 600 advanced practitioners serving more than 3 million residents in central and northeastern Pennsylvania with a health plan serving a half million members. Geisinger's strong commitment to innovation and research include providing internal research funding which facilitates collaborations across a broad range of clinical and health services research topics. In addition to managing, mentoring and training research staff, I am involved in a number of diverse health services research projects inclusive of health, utilization, effectiveness and cost-related outcomes as in my previous work at Battelle's Center for Public Health Research and Evaluation and the CDC. The citations below are a sample of work covering diverse topics: a performance measure for chronic kidney disease, a Medicaid managed care model, the impact of socioeconomic factors on thyroid cancer outcomes, and cost savings from eliminating drug copayments.


1. Thorp ML, Smith DH, Johnson ES, Vupputuri S, Weiss JW, Petrik AF, Yang X, Levey AS, Wasse H, Muoneke R, **Snyder SR**. Proteinuria among patients with chronic kidney disease: a performance measure for improving patient outcomes. Jt Comm J Qual Patient Saf. 2012 Jun;38(6):277-82.
2. Maeng DD, **Snyder SR**, Baumgart C, Minnich A, Tomcavage Janet; Graf,T. Medicaid Managed Care in an Integrated Healthcare Delivery System: Lessons from Geisinger's Early Experience. Popul Health Manag. 2015 Nov 13. PubMed PMID: 26565693.
3. Swegal WC, Singer M, Peterson E, Feigelson HS, Kono SA, **Snyder S**, Melvin TA, Calzada G, Ghai NR, Saman DM, Chang SS. Socioeconomic Factors Affect Outcomes in Well-Differentiated Thyroid Cancer. Otolaryngol Head Neck Surg. 2016 Mar;154(3):440-5. PubMed PMID: 26671905.
4. Maeng DD, Pitcavage JM, **Snyder SR**, Davis DE. The value of value-based insurance design: savings from eliminating drug co-payments. Am J Manag Care. 2016 Feb;22(2):116-21. PubMed PMID: 26885671.


**Evidence-Based Laboratory Medicine**

At the CDC I led the Evidence-Based Laboratory Medicine program including the Laboratory Medicine Best Practices™ (LMBP) initiative and quality indicator and measurement development efforts involving multiple contracts and cooperative agreements. The program purpose was to address a general lack of published

evidence and to increase the quality and quantity of evidence suitable for inclusion in systematic reviews and meta-analyses. LMBP was a multi-phase project to develop, test and implement transparent systematic review methods to evaluate healthcare quality improvement practices focused on laboratory medicine. LMBP was supported by contracts with Battelle Memorial Institute and work was completed under the direction of a national workgroup of multidisciplinary experts. The LMBP methods included an innovative approach for submission and inclusion of unpublished study data. Each evidence review was directed by an expert panel representing diverse stakeholders. Extensive engagement efforts were undertaken with laboratory professional and industry organizations to enhance quality improvement studies and disseminate LMBP findings and methods, including tutorials for continuing education credit. I was responsible for leading a multi-disciplinary team of 20 experienced staff and consultants performing the following activities: project management, methods development, new topic identification, completion of systematic reviews, communication and dissemination, and meeting facilitation. I am a co-author with the LMBP team on the first six LMBP systematic reviews of evidence of the effectiveness for 20 quality improvement practices. The first four reviews were published with commentaries in a special section of Clinical Biochemistry in 2012 entitled “Evidence in Action.”

1. **Snyder SR**, et al. Effectiveness of barcoding for reducing patient specimen and laboratory testing identification errors: a Laboratory Medicine Best Practices systematic review and meta-analysis. Clin Biochem. 2012 Sep;45(13-14):988-98. PubMed PMID: 22750145.
2. **Snyder SR**, et al. Effectiveness of practices to reduce blood culture contamination: a Laboratory Medicine Best Practices systematic review and meta-analysis. Clin Biochem. 2012 Sep;45(13-14):999-1011. PubMed PMID: 22709932.
3. Layfield C, Rose J, Alford A, **Snyder SR**, et al. Effectiveness of practices for improving the diagnostic accuracy of Non ST Elevation Myocardial Infarction in the Emergency Department: A Laboratory Medicine Best Practices™ systematic review. Clin Biochem. 2015 Mar;48(4-5):204-12.PubMed PMID: 25661303.
4. Buehler SS, Madison B, **Snyder SR**, et al. Effectiveness of Practices To Increase Timeliness of Providing Targeted Therapy for Inpatients with Bloodstream Infections: a Laboratory Medicine Best Practices Systematic Review and Meta-analysis. Clin Microbiol Rev. 2016 Jan;29(1):59-103. PubMed PMID: 26598385.

**Systematic Review Evidence for Improving Public Health**

At CDC I served as a staff economist supporting the Guide to Community Preventive Services (The Community Guide) and the Community Preventive Services Task Force, serving as a member of multi-disciplinary Coordination Teams for Violence Prevention and Diabetes. I contributed to several published systematic reviews of evidence on the effectiveness of public health interventions used to support evidence-based recommendations by the Task Force. In addition I completed systematic reviews of economic evaluations for interventions with sufficient evidence of effectiveness for inclusion in the published reviews, and also contributed to Community Guide methods development. Subsequently in the CDC Division of Laboratory Systems, I led development and implementation of new methods for systematic reviews and meta-analyses for healthcare quality improvement interventions associated with clinical laboratory medicine. In this role I also trained staff and supervised review teams to complete methods testing and systematic reviews.

1. Norris SL, Nichols PJ, Caspersen CJ, Glasgow RE, Engelgau MM, Jack L, Isham G, **Snyder SR**, Carande-Kulis VG, Garfield S, Briss P, McCulloch D. The effectiveness of disease and case management for people with diabetes. A systematic review. Am J Prev Med. 2002 May;22(4 Suppl):15-38. PubMed PMID: 11985933.
2. Hahn RA, Lowy J, Bilukha O, **Snyder S**, Briss P, Crosby A, Fullilove MT, Tuma F, Moscicki EK, Liberman A, Schofield A, Corso PS; CDC Task Force on Community Preventive Services. Therapeutic foster care for the prevention of violence: a report on recommendations of the Task Force on Community Preventive Services. MMWR Recomm Rep. 2004 Jul 2;53(RR-10):1-8. Review. PubMed PMID: 15229410.
3. Hahn RA, Bilukha O, Crosby A, Fullilove MT, Liberman A, Moscicki E, **Snyder S**, Tuma F, Briss PA; Task Force on Community Preventive Services. Firearms laws and the reduction of violence: a systematic review. Am J Prev Med. 2005 Feb;28(2 Suppl 1):40-71. PubMed PMID: 15698747.
4. Christenson RH, **Snyder SR**, Shaw CS, Derzon JH, Black RS, Mass D, Epner P, Favoretto AM, Liebow EB. Laboratory medicine best practices: systematic evidence review and evaluation methods for quality improvement. Clin Chem. 2011 Jun;57(6):816-25. PubMed PMID: 21515742.

**Complete List of Published Work in MyBibliography:**

http://www.ncbi.nlm.nih.gov/sites/myncbi/susan.snyder.1/bibliography/48222322/public/?sort=date&direction=ascending

## D. Research Support

### Ongoing Research Support

Geisinger Clinic Research Fund Snyder (PI) Dates: 4/2015 - 3/2017
Economic outcomes of genomic return of results to MyCode Participants
The purpose of this project is to develop healthcare utilization and cost estimates for medically actionable incidental findings from genomic return of results to contribute initial data from patient experience for three cohorts: all patients, Lynch Syndrome (colon cancer) and hereditary breast and ovarian cancer (BRCA1/2).

Cernostics, Inc. Snyder (PI) Dates: 12/2015 - 12/2016
Cost-effectiveness analysis using decision analysis modeling and simulation of a new risk prediction test, Tissue Cypher™, which assigns patients diagnosed with Barrett's esophagus to low, intermediate or high risk categories for progression to high grade dysplasia or esophageal adenocarcinoma to guide endoscopic surveillance and treatment decisions versus the guideline-based standard of care from a health plan perspective.

NIH/NHGRI 3U01HG007269 -02S1 Johnson - University of Florida (PI) Dates: 1/2015 - 6/2016
Economic evaluation of HLA-B*1502 genotyping in carbamazepine induced Stevens–Johnson Syndrome (SJS) and Toxic Epidermal Necrolysis (TEN)
The purpose of this project is development of a new generic cost-effectiveness decision analysis and simulation model for using a previously published model from Thailand with consensus-based modifications reviewed by an international project team. The Excel-based model enables users to provide input values for a limited set of parameters from which cost-effectiveness results and threshold analysis are generated for policy and decision making. .
Role: Co-Investigator

NIH U01GH008679-01 Carey (PI) Dates: 8/1/2015 - 7/31/2019
EMR-Linked Biobank for Translational Genomics (eMERGE)
The goals of this study are to use existing biospecimens, genotype and sequence data and EMR generated phenotypes for discovery in proposed disorders (familial hypercholsesterolemia and chronic rhinosinusitis) for implementation of genomic information in clinical practice and to explore, develop and implement and evaluate family-centered communication approaches for clinically relevant genomic results.
Role: Co-Investigator

### Completed Research Support

CDC SP0700-00-D-3180-0723/CB 11-0214 Skarpness (PI) Dates: 08/31/11-08/30/14
Evidence-Based Best Practice Recommendations in Laboratory Medicine
The purpose of this multi-phase project was to develop and apply transparent and systematic methods for identifying evidence-based best practices in laboratory medicine (Laboratory Medicine Best Practices™) that incorporated both published and unpublished evidence.
Role: Project Officer/PI (CDC: 2006-2011); Deputy Project Director/Technical Lead (Battelle: 2011-2013)