BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
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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 evaluations. My research spans diverse areas including precision/personalized medicine, population health, laboratory medicine, technology assessment, patient safety, healthcare delivery models, quality measurement, financing and insurance. I've served in the capacity of Principal and Co-Investigator, Project Officer, Task Leader and Technical Consultant on projects supported by government, nonprofit, industry and internal funding sources. Since 2013 I've been an Associate Professor at Geisinger Health System in the Department of Epidemiology and Health Services Research. 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 the Prevention Effectiveness Post-doctoral fellowship program with the Guide to Community Preventive Services and served as a Senior Economist and Team Lead of an Evidence-Based Laboratory Medicine program in the Division of Laboratory Systems. This followed 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 with fields in Health Care and Labor Economics.

My research interests are focused on developing and applying evidence to optimize the impact of precision medicine and population health 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 involved with multiple research initiatives in 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) including the Personalized/Precision Medicine Special Interest Group.

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, 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 Senior Economist and Team Lead (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 Health Care Services 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 to inform decision making. Economic evaluation has an important role in creating a more efficient healthcare system by directing patients toward beneficial prevention and treatment strategies and away from ones that are unlikely to improve outcomes and may pose risk for harm. Modeling approaches offer comparative assessments of value inclusive of a chain of evidence from multiple sources to estimate clinical and economic outcomes for improving population health. To guide development of much needed

evidence, I've co-authored a paper identifying important pharmacogenomic economic evidence gaps where research is likely to have a substantial impact on technology development and practice decisions, and another describing a process to develop and validate a generic economic evaluation model and decisionmaking tool with a pharmacogenomic use case. My research includes government and industry-funded analyses of personalized medicine applications and the Geisinger MyCode Community Health Initiative described below.

- 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 screening 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 with an initial focus on a hereditary breast and ovarian cancer (BRCA 1 and 2) cohort.

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**, Leeming R, Rahm AK, Hao J, Pitcavage JM. High-risk breast cancer clinic — a new risk-stratified, evidence-based, and efficient patient care model. J Patient Cent Res Rev. 2016; 3:192-3.
3. 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.
4. **Snyder SR** et al., Generic Economic Evaluation Models for Pharmacogenomics: A Tool to Inform Decision-making for Precision Medicine. Manuscript under review.

Health Economics Research and Evaluation

I am Director of the Health Economics Research and Evaluation (HERE) team of investigators and analysts in Geisinger's Department of Epidemiology and Health Services Research within a large integrated health system with over 1,000 physicians and 600 advanced practitioners serving more than 3 million residents in central and northeastern Pennsylvania, and a health plan serving a half million members. Geisinger's strong commitment to innovation, population health and research include providing internal research funding to facilitate collaboration 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 The citations below are a sample of work covering diverse topics.

1. 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.
2. 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.
3. 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.
4. Maeng DD, **Snyder SR**, Davis TW, Tomcavage JF. Impact of a Complex Care Management Model on Cost and Utilization Among Adolescents and Young Adults with Special Care and Health Needs. Popul Health Manag. 2017 Mar 24. [Epub ahead of print] PubMed PMID: 28338416.

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

NIH/NHGRI 1R01HG009694-01 Peterson - Vanderbilt University Medical Center (PI) Dates: 09/05/2017 – 07/31/2021
Rational Integration of clinical SEquencing (RISE)
The aims are to understand the impact of drivers of economic value in genomic screening, assess the impact of real world use data on genomic screening policy implications, and identify key evidence gaps and research priorities in genomic screening.
Role: Co-Principal Investigator

Progenity, Inc. Snyder (PI) Dates: 3/1/2017 – 8/31/2018
Economic and Health Outcomes Associated with Pre-eclampsia and Benefits of a New Diagnostic Test
The purpose of the study is to complete a pre-eclampsia cost of illness analysis and cost-effectiveness and budget impact analyses of a new pre-eclampsia diagnostic test for pregnant women at risk of pre-eclampsia from a payer/integrated healthcare system perspective.

Geisinger Health Plan/Clinic Quality Pilot Fund Leeming (Director) Dates: 7/1/2017-6/30/2019
Population-Based Risk Assessment for Breast Cancer Screening and Prevention: Implementing Evidence-based Recommendations and Shared Decision Making
The project will implement and evaluate a breast cancer risk assessment automated application at mammography screening to stratify women and offer risk-based screening and prevention services to optimize patient outcomes and the value of healthcare services through adherence to evidence-based guidelines.
Role: Co-Investigator

Geisinger Clinic Research Fund Snyder (PI) Dates: 4/2015 - 3/2018
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).

Completed Research Support

NIH/NHGRI 3U01HG007269 -02S1 Johnson - University of Florida (PI) Dates: 1/2015 - 6/2016
Generic Pharmacogenomic Decision Analysis Economic Evaluation Model (HLA-B*1502 genotyping to prevent carbamazepine-induced Stevens–Johnson Syndrome (SJS) and Toxic Epidermal Necrolysis (TEN))
Development of a novel generic cost-effectiveness decision analysis and simulation model with an international team and consensus-based approach including an Excel-based user-friendly tool from which cost-effectiveness results and threshold analysis are generated for policy/decision making.
Role: Co-Investigator

CDC SP0700-00-D-3180-0723/CB 11-0214 Liebow - Battelle (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 to support evidence-based recommendations.
Role: Project Officer/PI (CDC: 2006-2011); Deputy Project Director/Technical Lead (Battelle: 2011-2013)