

# PUBLIC HEALTH RESEARCH FOR MUSCULOSKELETAL HEALTH

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MEDICINE *of*  
THE HIGHEST ORDER



UR  
MEDICINE

Orthopaedics  
& Rehabilitation

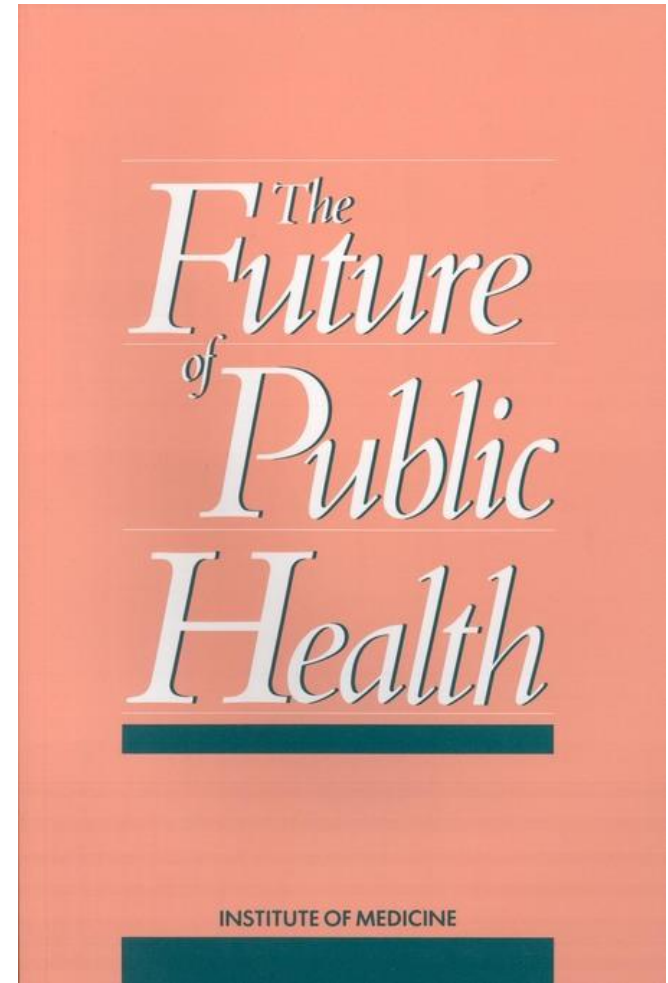
# Plan for today

- Public Health and its dimensions
- The practice of Health Services Research (HSR)
- HSR funding and decision-making
- HSR training and careers
- HSR impact

# PUBLIC HEALTH & ITS DIMENSIONS

# Public Health

“ ... what we as a society do collectively to assure the conditions in which people can be healthy”



*Institute of Medicine, 1988*

# Examples of Public Health Programs

- Early intervention and prevention
  - Immunization
  - Control of communicable diseases
  - School health

# Population Health

“... the health outcomes of a group of individuals, including the distribution of such outcomes within the group.”

- Health outcomes
- Health determinants
- Policies and interventions

*Kindig & Stoddart (AJPH - 2003)*

# Examples of Population Health Programs

- Accountable care organizations
  - Medicare Shared Savings Program
- Bundled payment programs
  - Comprehensive Care for Joint Replacement
- Patient-centered medical home
  - State Medicaid Medical Home Programs

# Practice and Research Dimensions

- URMC – Department of Public Health Sciences
  - Health Services Research and Policy (HSR)
  - Epidemiology
  - Social and Behavioral Sciences



# Epidemiology

- Study of the distribution and determinants of health-related states and events in specified populations



American Journal of Epidemiology  
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Printed in U.S.A.

## Epidemiology of Sarcopenia among the Elderly in New Mexico

ORIGINAL ARTICLE

Effect of Physical Activity on Functional Performance and  
Knee Pain in Patients With Osteoarthritis

*Analysis With Marginal Structural Models*

# Social and Behavioral Sciences

Matern Child Health J (2010) 14:931–937  
DOI 10.1007/s10995-009-0531-9

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## **Feto-infant Health and Survival: Does Paternal Involvement Matter?**

Preventive Medicine 31, 364–369 (2000)  
doi:10.1006/pmed.2000.0721, available online at <http://www.idealibrary.com> on **IDEAL**<sup>®</sup>

## Smokers Ages 50+: Who Gets Physician Advice to Quit?

Matern Child Health J (2013) 17:689–698  
DOI 10.1007/s10995-012-1045-4

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## **Labor Epidural Anesthesia, Obstetric Factors and Breastfeeding Cessation**

# Health Services Research

“ ... how social factors, financing systems, organizational structures and processes, health technologies, and personal behaviors affect access to health care, the quality and cost of health care, and ultimately, our health and well-being”



Agency for Healthcare Research and Quality  
Advancing Excellence in Health Care

# THE PRACTICE OF HEALTH SERVICES RESEARCH

# Examples of Research Questions

Clinical Review & Education

JAMA | Special Communication

## Health Care Spending in the United States and Other High-Income Countries

Irene Papanicolas, PhD; Liana R. Woskie, MSc; Ashish K. Jha, MD, MPH

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

## Mortality and Access to Care among Adults after State Medicaid Expansions

Benjamin D. Sommers, M.D., Ph.D., Katherine Baicker, Ph.D., and Arnold M. Epstein, M.D.

Research

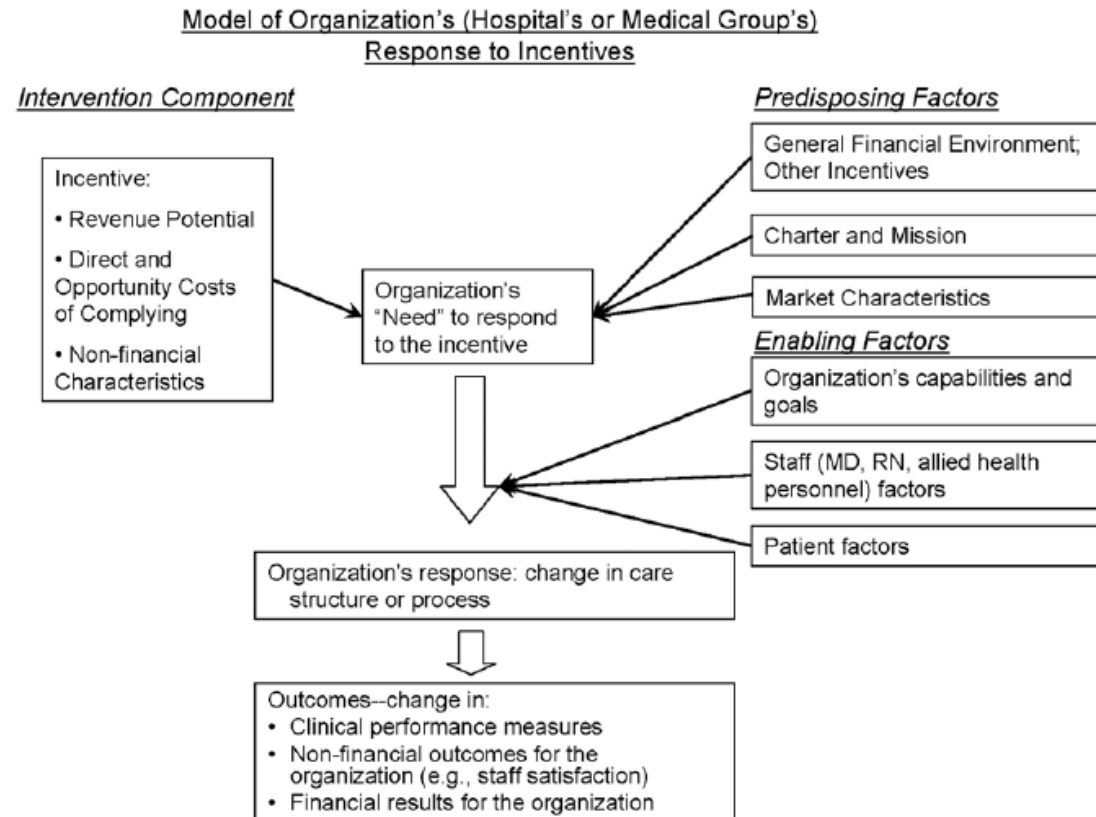
Original Investigation

## In-Hospital Outcomes and Costs Among Patients Hospitalized During a Return Visit to the Emergency Department

Amber K. Sabbatini, MD, MPH; Keith E. Kocher, MD, MPH; Anirban Basu, PhD, MS; Renee Y. Hsia, MD, MSc

# Theoretical & Conceptual Frameworks

Figure 3: Model of an organization's response to incentives



Dudley (AHRQ – 2004)

# Study Designs

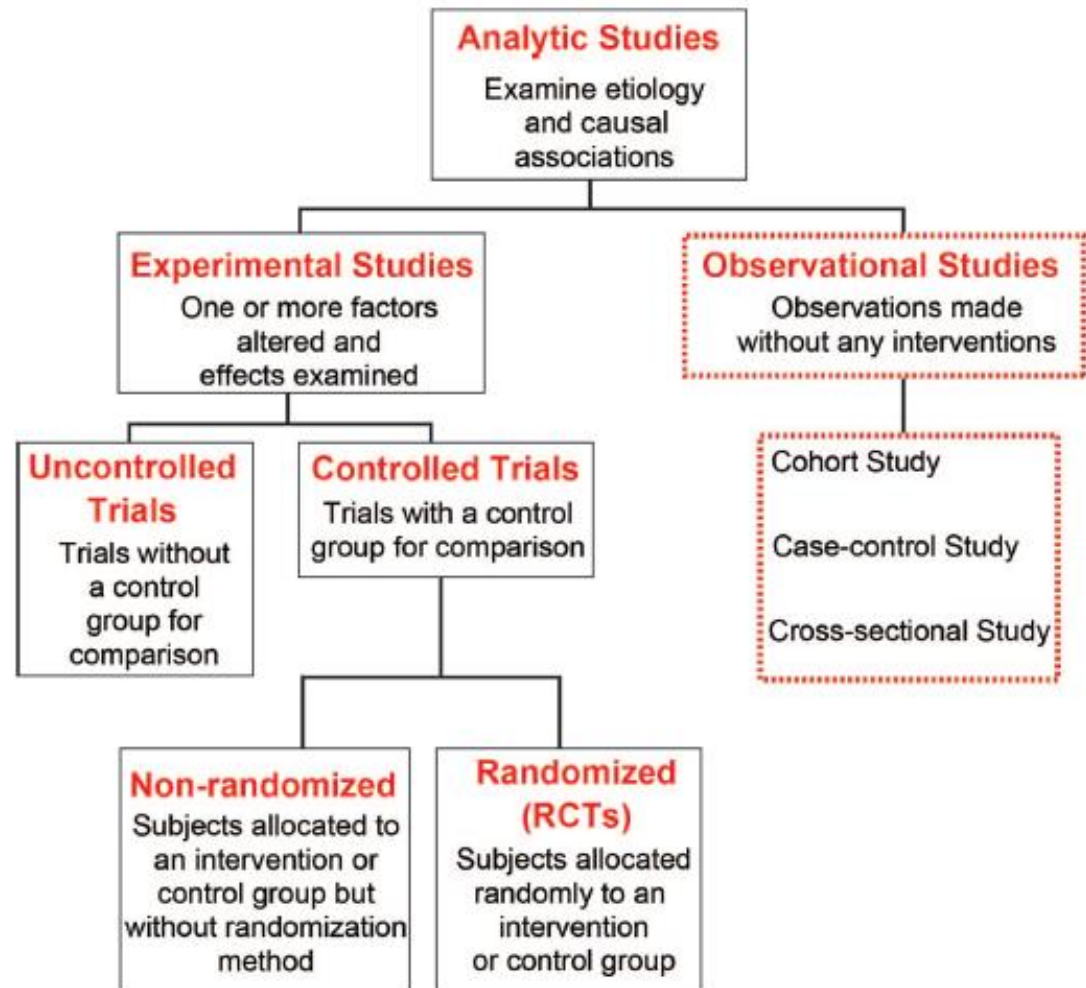


Fig. 1. Analytic study designs. (Adapted with permission from Joseph Eisenberg, Ph.D.)

Song (*Plast Reconstr Surg* – 2010)

# Threats to validity in observational research

- Confounding
  - Measured or unmeasured
  - Observed or unobserved
- Bias
  - Selection bias
  - Information bias
- Chance



# Data for addressing the Questions

- Primary
  - Surveys
  - Focused group discussions
  - Interviews
  - Delphi techniques
- Secondary
  - Administrative: Billing data from hospitalizations, outpatient encounters – National, State, Local
  - Medical: Medical record data from these encounters

# Screenshots of secondary data

- MBSF file for 2017 – Medicare administrative data

# Screenshots of secondary data

- Medical record data for 2016 – URMC Orthopaedics

# Data processing

- Data curation (screenshots)
- Variable generation (screenshots)

# Research Methods

- Qualitative
  - Thematic analysis
  - Content analysis
- Quantitative
  - Multivariable regressions
  - Propensity score matching
  - Difference-in-differences
  - Interrupted time series
  - Instrumental variables
  - Randomized evaluations

# HEALTH SERVICES RESEARCH FUNDING & DECISION-MAKERS

# Federal Funding Agencies



# Other Funding Agencies



The  
COMMONWEALTH  
FUND

Affordable, quality health care. For everyone.



Robert Wood Johnson  
Foundation

greater rochester

Health  
*foundation*



Orthopaedic Research Society



ORTHOAEDIC RESEARCH  
AND EDUCATION FOUNDATION

AAOS

AMERICAN ACADEMY OF  
ORTHOPAEDIC SURGEONS



# Journals of Interest



# JAMA<sup>®</sup>

The Journal of the American Medical Association

## Annals of Internal Medicine

*Established in 1927 by the American College of Physicians*

# HSR

J<sup>B</sup>J<sup>S</sup>

The Journal of  
Bone & Joint Surgery

# Associations / Foundations



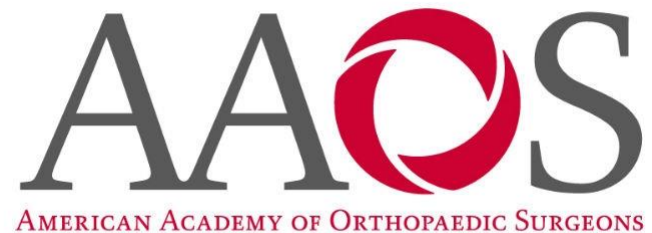
AcademyHealth



AMERICAN PUBLIC HEALTH ASSOCIATION  
*For science. For action. For health.*



# Decision makers



# HEALTH SERVICES RESEARCH TRAINING & CAREERS

# HSR Doctoral Training

- Access, quality, and cost of care
  - Interdisciplinary foundation, including economics, psychology, history
  - Theory-based explanations and models
- Data and methods for addressing the research questions

# HSR: Career paths

- Academic settings – Research, teaching, staff scientist
- Consulting
- Federal / state / local governing bodies
- Healthcare facilities
- Insurance

# HEALTH SERVICES RESEARCH IMPACT

# HSR Impact

- Develop a scientific evidence base to support decision making
- Need to articulate and disseminate findings
- Ultimate endpoint – how will the patient be affected?
- Incremental work
- Examples – National, State, Local (Academic, non-academic)



# National example

## HOSPITALS

By Caroline P. Thirukumaran, Laurent G. Glance, Xueya Cai, Rishi Balkissoon, Addisu Mesfin, and Yue Li

DOI: 10.1377/hlthaff.2018.05264  
HEALTH AFFAIRS 38,  
NO. 2 (2019): 190-196  
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The People-to-People Health  
Foundation, Inc.

# Performance Of Safety-Net Hospitals In Year 1 Of The Comprehensive Care For Joint Replacement Model

*Health Affairs, 2019*

# National example (cont'd)

- Bundled payment program for joint replacements
  - Likely to disadvantage safety-net hospitals
  - Examined performance in year 1 of the program
  - Safety-net hospitals were less likely to earn rewards and the size of their rewards was smaller

# State example

Clin Orthop Relat Res (2019) 477:1221-1231  
DOI 10.1097/CORR.0000000000000684

Clinical Orthopaedics  
and Related Research®  
A Publication of The Association of Bone and Joint Surgeons\*

## Clinical Research

### **What Is the Association Between Hospital Volume and Complications After Revision Total Joint Arthroplasty: A Large-database Study**

Benjamin F. Ricciardi MD, Andrew Y. Liu MD, Bowen Qiu MD, Thomas G. Myers MD,  
Caroline P. Thirukumaran MBBS, MHA, PhD

*CORR, 2019*

# State example (cont'd)

- Do hospitals with higher volumes of revision joint replacements have better outcomes?
  - Measured using complications, readmissions,
  - Data from inpatient admissions from New York State from 2008 to 2014
  - Hospitals with higher volumes had better outcomes

# Local example - Academic

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## Natural Language Processing for the Identification of Surgical Site Infections in Orthopaedics

Caroline P. Thirukumaran, MBBS, MHA, PhD, Anis Zaman, MA, Paul T. Rubery, MD, Casey Calabria, CIC, BSN-RN, MBA, Yue Li, PhD, Benjamin F. Ricciardi, MD, Wajeeh R. Bakhsh, MD, and Henry Kautz, PhD

*Investigation performed at the University of Rochester, Rochester, New York*

*JBJS, 2019*

# Local example (cont'd)

- Can Natural Language Processing (NLP) automate the identification of surgical site infections from medical record data
  - NLP based models were comparable in their predictive abilities to manual abstraction
  - NLP can serve as a complement to ongoing manual surveillance efforts

# Local example – Non-Academic

- Pediatric Surgical Quality Improvement Committee
  - Examine prevalence of complications at UR
  - Identify areas for improvement
  - Implement interventions
  - Test the impact of interventions
  - E.g. SSI prevention bundles among spine surgery patients

# CONCLUSION



# Public Health Research 101

- What is Public Health Research?
- How is Public Health Research organized?
- What is Health Services Research and how is it organized?
- Impact of Health Services Research?

# Questions & Comments

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