BIOGRAPHICAL SKETCH

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NAME: Deepika Mohan

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

POSITION TITLE: Assistant Professor – Department of Critical Care Medicine and Surgery

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
Princeton University, Princeton, NJ	BA	1997	Religion and Political Theory
Emory University, Atlanta, GA	MD	2001	Medicine
Emory University, Atlanta, GA		2001-2002	Internship, General Surgery
Columbia University, New York City, NY	MPH	2003	Public Health
Emory University, Atlanta, GA		2003-2007	Residency, General Surgery
University of Pittsburgh, Pittsburgh, PA		2007-2008	Fellowship, Surgical Critical Care

A. Personal Statement

I am a trauma surgeon, intensivist, and health services researcher who studies how doctors think. My goal is to improve the quality of care provided to patients with critical illness by understanding decisions that occur under conditions of time-pressure and uncertainty. Through a mentored research career development award from NIGMS, I gained experience in using different quantitative and qualitative methods to study variation in physician decision making (e.g. secondary analysis of administrative data, survey instruments, simulation, semi-structured interviews). It led to some of the first empirical evidence that heuristics (intuitive judgments) play a role in variation in trauma triage, and resulted in multiple publications in well-respected peer-reviewed journals, including *Annals of Surgery, PloS One*, and *Medical Decision Making*. Work from that award also allowed me to compete successfully for a DP2 grant from the NIH's Office of the Director to develop a novel intervention to recalibrate physician heuristics in trauma triage. This grant is awarded each year to 30 early stage investigators who propose "high risk/high reward" research programs.

The current application is a natural outgrowth of work done during my career development award, translating insights and methods to the decision problem of sepsis. It leverages my clinical experience in the Intensive Care Unit, familiarity with the mixed methods necessary to analyze physician cognitive processes, and collaboration with world-renowned leaders in behavioral science, sepsis, and emergency medicine (Drs. Fischhoff, Angus, Yealy). My major contributions to science, described in Section C in greater detail, are directly relevant to the aims and activities of the current proposal, which will develop a novel intervention to recalibrate physician heuristics in sepsis.

A1. **Mohan D,** Farris C, Angus DC, Fischhoff B, Rosengart MR, Yealy DM, Ricketts D, and Barnato AE. Assessing the validity of using serious game technology to analyze physician decision making. PLoS One. 2014; 9:e105445

A2. **Mohan D**, Fischhoff B, Farris C, Switzer GE, Rosengart MR, Yealy DM, Saul M, Angus DC, Barnato AE. Validating a vignette-based instrument to study physician decision making in trauma triage. Medical Decision Making. 2014 34(2): 242-252.

A3. **Mohan D,** Rosengart MR, Farris C, Fischhoff B, Angus DC, and Barnato AE. Sources of non-compliance with clinical practice guidelines in trauma triage: a decision science study. Implementation Science. 2012; 7(1): 103.

A4. Barnato AE, **Mohan D**, Lane RK, Huang YM, Angus DC, Farris C, Arnold RM. Advance care planning norms may contribute to hospital variation in end-of-life ICU use. Medical Decision Making. 2014 34(4): 473-84.

B. Positions and Honors

Positions and Employment

2008–2009	Visiting Instructor, Department of Critical Care Medicine, University of Pittsburgh School of Medicine
2009–Present	Assistant Professor, Department of Critical Care Medicine, University of Pittsburgh School of Medicine
2009–Present	Assistant Professor, Department of Surgery, University of Pittsburgh School of Medicine
2010–Present	Assistant Professor, Clinical Science Translational Institute, University of Pittsburgh School of Medicine

Other Experience and Professional Memberships

1998	Research Assistant, Department of Pediatrics, St. Mary's Hospital, Imperial College of Medicine, London, UK
2006–2008	American College of Surgery
2008–Present	Society of Critical Care medicine
2007–Present	American College of Surgery
2015–Present	Medecins Sans Frontiers (Doctors Without Borders)

Honors

2000	Alpha Omega Alpha Society
2001	Evangeline Papageorge Award for service to medical school class
2008	Fellow of the year – Multidisciplinary Critical Care Program
2013	Fellow of the American College of Surgeons
2014	Selected to participate in the AAMC Women's Early Career Development Conference

C. Contributions to Science

1. Understanding variation in trauma triage. Each year, 50 million Americans experience a traumatic injury; 2 million require hospitalization; 500,000 have severe injuries, and 181,000 die of their injuries. Severely injured patients treated at trauma centers have better outcomes than patients treated at non-trauma centers. Yet, only about 50% of severely injured patients receive their care at trauma centers (*under-triage*). Researchers and policy makers describe continued under-triage as a problem of system-level constraints (e.g. poorly developed emergency medical services necessary to transport patients). During work done as part of my mentored career development award, my research team and I demonstrated that physicians contribute to the problem of under-triage (**a**). Existing educational and outreach efforts do not effectively address some of the reasons physicians fail to comply with clinical practice guidelines (**b**, **c**). Finally, we have quantified the scope of the impact that under-triage has on patients (**d**).
   a. **Mohan D**, Barnato AE, Angus DC, Rosengart MR. Determinants of Compliance with Transfer Guidelines for Trauma Patients: A Retrospective Analysis of CT Scans Acquired Prior to Transfer to a Level I Trauma Center. Ann Surg. 2010 251(5): 946-51.
   b. **Mohan D,** Rosengart MR, Farris CF, Angus DC and Barnato AE. Are American College of Surgeons Guidelines for the Transfer of Trauma Patients Feasible? Arch Surg. 2011; 146: 786-792
   c. **Mohan D,** Barnato AE, Rosengart MRR, Farris C, Yealy DM, Switzer GE, Fischhoff B, Saul M, Angus DC. Trauma triage in the Emergency Departments of non-trauma centers: an analysis of individual physician case-load on triage patterns. J Trauma. 2013; 74(6): 1541-7.

d. **Mohan D**, Barnato AE, Rosengart MR, Angus DC, Wallace DJ, Kahn JK. Triage patterns of patients with moderate-to-severe injuries presenting to non-trauma centers. Ann Surg. 2014. Epub ahead of print.

2. Methods of measuring determinants of physician decision making. One of my early observations was that physicians did not use rational principles (axioms of probability) to make triage decisions for trauma patients. For example, a young male patient with a gun shot wound had a far higher probability of receiving treatment at a trauma center than an old male patient with rib fractures after a fall, even though the elderly patient had a greater likelihood of dying from his injuries. However, little empirical evidence exists about the influence of heuristics on physician decision making in practice. Two problems produces this gap in the science. First, most cognitive processes occur unconsciously. When asked to explain their decision making, people will confabulate, or make erroneous attributions. Second, existing experimental methods lack sufficient precision to detect the cognitive processes of *individual* physicians. Together our group demonstrated the limitations of the existing best practice method (i.e. paper vignettes) to study physician performance (**a**). We then developed a mixed-methods approach including: signal detection theory analysis (**b**), virtual simulation (**c**), and standardized patients with stimulated-recall cognitive interviews (**d**). We have published some of the first empirical evidence that heuristics play an important role in physician decision making in trauma and at the end-of-life.

   a. **Mohan D**, Fischhoff B, Farris C, Switzer GE, Rosengart MR, Yealy DM, Saul M, Angus DC, Barnato AE. Validating a vignette-based instrument to study physician decision making in trauma triage. Med Decis Making. 2014; 34(2): 242-252.
   b. **Mohan D,** Rosengart MR, Farris C, Fischhoff B, Angus DC, and Barnato AE. Sources of non-compliance with clinical practice guidelines in trauma triage: a decision science study. Implement Sci. 2012; 7(1): 103.
   c. **Mohan D,** Farris C, Angus DC, Fischhoff B, Rosengart MR, Yealy DM, Ricketts D, and Barnato AE. Assessing the validity of using serious game technology to analyze physician decision making. PLoS One. 2014; 9:e105445
   d. Barnato AE, **Mohan D**, Lane RK, Huang YM, Angus DC, Farris C, Arnold RM. Advance care planning norms may contribute to hospital variation in end-of-life ICU use. Med Decis Making. 2014. 34:473-84

Complete List of Published Work:
http://www.ncbi.nlm.nih.gov/sites/myncbi/10yvdxdfyQXQl/bibliography/42040339/public/?sort=date&direction=descending

D. Research Support

Research Support (during the past three years)

1K23GM101292 Mohan (PI) 5/30/2012–5/29/2016
Time pressured decision making in trauma triage
The goal of this career development award is to develop the educational and research skills necessary to become an independent researcher. The scientific objective is to use basic behavioral science methodology to understand the role of heuristics (intuitive judgments) on physician decision making in trauma triage.
Role: Principal Investigator

University of Pittsburgh Physicians Academic Foundation Mohan (PI) 7/1/2015-6/30/2016
Developing a serious game intervention to improve physician decision making
The goal of this project is to develop a serious game to recalibrate physician heuristics in trauma triage. We will use serious game technology to provide physicians with experience and feedback in a simulated environment that makes continuing education appealing and engaging.
Role: Principal Investigator

DP2 LM012339-01 Mohan (PI) 10/1/2015–9/30/2020
Developing a novel intervention to make physician heuristics a source of power

The objective of this research program is to evaluate the effect of recalibrating physician heuristics in trauma triage. We will compare the effectiveness of a serious game tool to recalibrate heuristics with the existing standard of practice (education, opinion outreach).
Role: Principal Investigator