

**STRUCTURAL APPROACHES TO
ADDRESS ISSUES IN PATIENT
SAFETY**

ADVANCES IN HEALTH CARE MANAGEMENT

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STRUCTURAL APPROACHES TO ADDRESS ISSUES IN PATIENT SAFETY

GUEST EDITED BY

SUSAN D. MOFFATT-BRUCE

The Ohio State University, USA

SERIES EDITOR

TIMOTHY R. HUERTA

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LIST OF REVIEWERS

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*Tulane University of Public Health and
Tropical Medicine, New Orleans, USA*

ABOUT THE CONTRIBUTORS

Myrte **Alfred** is a Postdoctoral Scholar at the Medical University of South Carolina. Her research involves applying human factors in clinical systems including sterile processing, robotic-assisted surgery, and anesthesia medication delivery. She also works with the hospital's quality and risk teams in improving clinical operations and patient care.

Prof. Dr. Alfred Angerer is a Professor of Health Care Management at the Winterthur Institute of Health Economics at ZHAW Zurich University of Applied Sciences.

Emanuela-Anna Azzopardi, RN, BSc (Hons), MSc, is a Midwife and Patient Safety Officer at Mater Dei Hospital, Malta. She qualified as a registered staff nurse in 1983 and as a midwife in 1985. She has also occupied positions as Nursing Officer and as Midwifery Manager at St James Hospital, Malta.

Rebecca Berg, MS, is a Simulation Learning Consultant for Yale New Haven Health's SYN: APSE Center for Learning, Transformation, and Innovation. Her work focuses on human factors including environmental design, device testing, and workflow analysis.

George Blike, MD, MHCDS, is a Professor of Anesthesiology and Community Family Medicine in the Geisel School of Medicine and has been Chief Quality and Value Officer of the Dartmouth-Hitchcock Health System since 2012, with direct oversight of clinical quality improvement including applied systems engineering and implementation/health care delivery science.

Sandra C. Buttigieg, MD, PhD (Aston), is Associate Professor in HSM at the University of Malta, and Honorary Senior Research Fellow, HSMC, University of Birmingham, UK. She is Public Health Consultant and Member of the Patient Safety Team, Mater Dei Hospital, Malta. She is AOM HCM Global Representative-at-Large and EHMA Board Member. She was Lead Guest Editor of AHCM volume 17.

Vincent Cassar, PhD (Lond), CPsychol (UK), CSci (UK), is currently Deputy Dean at the Faculty of Economics, Management and Accountancy at the University of Malta, an Honorary Teaching Fellow at Birkbeck College (University of London), and Visiting Scholar at the University of Zagreb (Croatia) and Wroclaw University of Economics (Poland).

Ken Catchpole is a Human Factors Research Practitioner who has spent the last 16 years applying sociotechnical systems theories to improve safety and

performance in acute care. He has authored over 80 peer-reviewed journal articles and contributes to clinical operations via incident analysis and human-centered improvement projects.

Beth Crandall, BS (Crandall Consulting), studies cognitive performance in real-world settings. Her research interests include the nature of complex systems, the interplay of systems of human operators, work teams, technologies, and physical work spaces in high-risk work environments, as well as the design of work environments that better support individual and team performance.

Brian Cunningham, MS, is a Transformation and Culture Consultant within Human Resources at Cincinnati Children's Hospital. He actively leads and consults on organization-wide change efforts and strategic improvements. From 2013 to 2016, he served as the Quality Improvement Consultant for the Division of Occupational Therapy and Physical Therapy at Cincinnati Children's Hospital as part of his role in the James M. Anderson Center for Health Systems Excellence.

Larry Fredendall, Trevillian Distinguished Professor of Management at Clemson University, teaches Supply Chain Management. His research investigates continuous improvement and lean in health care. He served as Editor of the *Quality Management Journal* and Guest Editor for a special issue on health care delivery in the *Journal of Operations Management*.

James Greenberg, MD, is Chief of the Division of Neonatology at Cincinnati Children's Hospital Medical Center. Over the past 25 years, he has supported several NICU redesigns focusing on alignment of operational safety and efficiency. He is Lead Physician Executive for Cincinnati Children's new 630,000-square-foot Critical Care Building.

Anna Grome, MS, is a principal consultant and research psychologist at TiER1 Performance. Her interests focus on human performance in organizational settings ranging from health care to military operations and *Fortune 500* companies. She uses research insights to optimize individual and team performance through solutions including workspace and process redesign, change management, training and performance support, communications, and improved user tools and technology.

Courtney Hebert, MD, MS (The Ohio State University, United States), is a practicing Physician in the field of infectious diseases and an Assistant Professor at the Department of Biomedical Informatics. Her research focuses on the secondary use of electronic health record data to better treat and prevent infections.

Jennifer L. Hefner, PhD, MPH, is an Assistant Professor of Health Services Management and Policy. She is the Associate Editor of *Advances in Health Care Management* and conducts research in the fields of health care transformation, health information technology, and the intersection of quality measurement, patient safety, and patient experience.

Tory H. Hogan, PhD, is an Assistant Professor of Finance and Management in the Division of Health Services Management and Policy at the Ohio State University. She conducts research in the field of health care innovation adoption, leadership, and organizational behavior. She teaches classes in health care finance and management.

Chelsea R. Horwood, MD, MPH, is a General Surgery Resident at The Ohio State University Wexner College of Medicine who focuses on improving patient safety via improving current alarm technology using a human factors- and systems-based approach.

Emily Huffer is a Senior at Clemson University studying Industrial Engineering. Her research is primarily focused on improving health care systems. After graduation, she will continue her education at Clemson, pursuing a Master's degree in Industrial Engineering.

Michelle A. Kiger, MHS, OTR/L, is a Clinical Manager with the Division of Occupational Therapy and Physical Therapy at Cincinnati Children's Hospital. She actively leads and supports evidence-based practice and quality improvement initiatives in various rehabilitation settings. From 2008 to 2015, she served as the evidence-based practice coordinator for the Division of Occupational Therapy and Physical Therapy at Cincinnati Children's Hospital.

Irene Kobler is a Research Associate at ZHAW Zurich University of Applied Sciences (health care management).

Dr Shreyas S. Limaye has a PhD in Industrial Engineering from University of Washington in Seattle and an MS in Industrial Engineering from University of Arizona in Tucson. He is a Principal Hardware Development Engineer at HGST, a Western Digital company.

Todd MacKenzie, PhD, is a Biostatistician and Professor of Biomedical Data Science and Director of the Master's Degree in Health Data Science at Geisel School of Medicine at Dartmouth College.

Dr Christina M. Mastrangelo, MS, PhD, is an Associate Professor of Industrial Engineering at the University of Washington. She holds a BS, MS, and PhD degrees in Industrial Engineering from Arizona State University. Prior to joining UW in 2002, she was an Associate Professor of Systems And Information Engineering at the University of Virginia.

Ann Scheck McAlearney, ScD, MS, is the Director of the Program for Health Services Research of CATALYST and a Professor in the Department of Family Medicine in the Ohio State's College of Medicine. She has over 30 years of health services research experience and has been actively involved in both performing research and disseminating research results to academic and practitioner audiences.

Krystal M. McGovern, MSN, RN, MBA, CCRN, is a Clinical Research Nurse at Dartmouth-Hitchcock Medical Center. She has an undergraduate degree in

Sociology, is a certified Critical Care Registered Nurse, and holds a Master of Nursing Science in Nursing Education. Krystal's research focuses on understanding individual and team facilitators and barriers managing hospitalized patient's clinical deterioration.

Dennis McGrath, MA, is an Engineer, Lean Six Sigma Blackbelt, and Modeler with an extensive background in assessing and improving complex systems. His work with complex systems over a 30-year timespan has included defense, homeland security, emergency response, critical infrastructure protection, and health care.

Susan P. McGrath, PhD, is a Biomedical Engineer and LSS Black Belt with 30 years of experience leading research and systems implementation in industry, academia, government, and non-profit organizations. She currently directs activities at Dartmouth-Hitchcock's Patient Safety Learning Laboratory, funded by industry and government partners.

Susan D. Moffatt-Bruce, MD, PhD, is the Executive Director of University Hospital at The Ohio State University Wexner Medical center and Professor of Surgery. She is the PI for the Institute for the Design of Environments Aligned for Patient Safety, which is focused on patient safety through improving methods and modes of communication.

Elizabeth Lerner Papautsky, MS, PhD is a Research Assistant Professor at the Department of Biomedical & Health Information Sciences at University of Illinois at Chicago. In her research on patient-centered care, she uses methods such as naturalistic observations, cognitive task analysis interviews, and artifact review. She applies findings to user-centered solutions such as interfaces, workflows, education, and training, with the goal of improving patient safety and care quality.

Mark V. Paterno, PT, PhD, MBA, is the Scientific Director in the Division of Occupational Therapy and Physical Therapy at Cincinnati Children's Hospital and a Professor in the Division of Sports Medicine within the Department of Pediatrics at the University of Cincinnati College of Medicine. He oversees research and quality improvement efforts within the Division of Occupational Therapy and Physical Therapy and conducts health services research in rehabilitation.

Irina Perreard, PhD, is a Bioengineer in the Department of Anesthesiology at Dartmouth-Hitchcock and works in the Patient Safety Learning Laboratory. She has a PhD in Mechanical Engineering and experience with computer modeling. She has participated in various research projects bridging technology and medicine and enjoys being part of a multidisciplinary team.

Joshua Ramos is a MD-MBA candidate at Dartmouth College and works in the Patient Safety Learning Laboratory. He has an undergraduate degree in Economics and has participated in multiple research projects focusing on the design, implementation, and analysis of technology-enhanced patient care programs, both in academia and industry.

Jessica M. Ray, PhD, is an Instructor in the Department of Emergency Medicine, Yale School of Medicine. Her user-centered system design research includes work in physical environments, technology, teams, and work processes. While at Yale New Haven Health, she supported openings in more than a dozen new environments.

Michael F. Rayo, PhD, is an Assistant Professor in the Department of Integrated Systems Engineering at The Ohio State University and a Scientific Advisor for patient safety at The Ohio State University Wexner Medical Center. His research and design work focuses on technology-mediated coordination to facilitate resilient system performance.

Rebecca Reder, OTD, OTR/L, is the Senior Clinical Director of the Division of Occupational Therapy and Physical Therapy (OT/PT) at Cincinnati Children's Hospital. With over 40 years of pediatric health care experience, she has been actively involved in transforming patient outcomes, experience, and value using evidence-based practice and improvement science methodology.

Elisabeth Dowling Root, PhD (The Ohio State University, US), is a Health Geographer and Associate Professor in the Department of Geography and Division of Epidemiology. Her work applies spatial statistics and Geographic Information Systems to examine socio-environmental drivers of health in hospital and community settings.

Prof. Dr. David Schwappach, MPH, is Scientific Director of the Swiss Patient Safety Foundation since 2008 and Professor of Patient Safety at the Institute of Social and Preventive Medicine (ISPM) at the University of Bern.

Kathleen Stewart, BS, is an Associate Infection Preventionist at Dartmouth-Hitchcock Medical Center. She has an undergraduate degree in Chemical Engineering, is an LSS Green Belt, and is matriculated in an MPH Program at Dartmouth College. She has worked in the Quality department for several years and has participated in various projects throughout the organization.

Nicole Spatafora, MS-HSM, is the Director of Programs for Vizient, the nation's largest member-driven health care performance improvement company. Vizient provides network-powered insights in the critical areas of clinical, operational, and supply chain performance and empowers members to deliver exceptional, cost-effective care. In her role at Vizient, Nicole connects with member organizations throughout the country to provide evidence-based leading practices, insights, and collaboration to identify key strategies and processes that address health care challenges resulting in improved performance outcomes.

Mariann L. Strenk is a Physical Therapist at Cincinnati Children's Hospital Medical Center. She is a Clinical Program Manager who has received training in use of improvement science methodology. She provides leadership and oversight of the Division of Occupational Therapy and Physical Therapy clinical teams/programs actively involved in translating research into clinical knowledge.

She participates in the coordination of strategic initiatives of the division related to clinical outcomes improvement.

Stephanie N. Sudikoff, MD, is Director of Simulation for Yale New Haven Health's SYN: APSE Center for Learning, Transformation, and Innovation, a simulation and experiential learning program focused on technology, adult education, and human factors. She oversees the design and execution of education, workflow analysis, device testing, facility design, and other initiatives.

Catherine C. Quatman-Yates, PT, DPT, PhD, is an Assistant Professor in the Division of Physical Therapy in the School of Health and Rehabilitation Sciences at The Ohio State University. She teaches classes in evidence-based practice and actively leads and supports health services research projects and quality improvement initiatives in various rehabilitation settings.

Kevin Taaffe is the Harriet and Jerry Dempsey Professor in Industrial Engineering at Clemson University. His research interests include the application of simulation and optimization in health care, production, and transportation logistics. In particular, Dr Taaffe focuses on health care logistics problems that range from patient flow to operating room scheduling.

Emily Wells, MPH, is a Clinical Research Coordinator at the Department of Surgery at University of Michigan. She is a trained epidemiologist and health services researcher with five years' experience applying mixed methods and intervention design to chronic disease prevention and surgical safety and quality in hospital and community-based settings.

FOREWORD

For decades, leaders in health care administration have looked to the published literature to inform health care processes and operations, and ultimately impact patient safety outcomes. Donabedian's model of Structure-Process-Outcome, as an initial lens through which safety issues have been explored, notes that structure drives process; however, much of health management empirical research has focused on the process and outcomes and then attempted to reverse engineer the structure that may reasonably support process and outcome success. Other models, such as the System Engineering Initiative for Patient Safety model (SEIPS), sought to offer a framework for understanding the structures, processes, and outcomes in health care and their relationships. This volume uses the lens of Donabedian and the SEIPS model to explore the link between the structure of the health care environment and patient safety outcomes. Particularly, the following chapters present techniques to leverage design thinking to improve patient and provider well-being, the impact of environments on vulnerable populations, and ultimately the overall impact we can have on patient experience when looked at from the systems' perspective.

I have always believed that the environments within which we provide care influence the outcomes. In my role as a health care administrator, I continue to engage in quality improvement projects to adjust the structure and context of health care and measure the impact of these changes. There are many parts and pieces to health care environments, and as such, the term "environment" and the impression of the impact therein means many different things to different stakeholders. The patient is often not selective of the environment, but rather seeks out the closest the clinic, hospital, or emergency room during a health care crisis at his or her most vulnerable moment. Therefore, the patient can do little to influence the health care environment but is completely dependent on those who design the health care system. Almost 20 years after the seminal publication of the Institute of Medicine report "To Err Is Human: Building a Safer Health System," much has changed, but much has stayed the same relative to patient safety.

There have been many interventions by hospitals and providers to improve the processes of health care delivery to improve outcomes, but less systems-based thinking has been adopted. Kobler et al. outline systems-based improvements that target hospital design. They explore the practicality of hospital design that affects not only efficiency and effective workflow and operations, but ultimately patient safety improvements. Ray et al. additionally explore environmental change through the introduction of the flexible process model, PROcess for

the Design of User Centered Environments (PRODUCE), which is designed to guide system change. This model was informed and ultimately refined by a series of real-world renovations, relocations, and new builds in a large multihospital health care system. The principles that are succinctly explored in this article are user-centered design, human factors, and in-situ simulation that engages users in the planning, testing, and implementation of physical environment change. This work is an important step toward building a body of literature around the practical process of hospital-based design to improve health care quality.

Limaye et al. subsequently introduce the very real concepts of using a systems modeling approach to reduce the risk of health care-associated infections (HAIs) and in particular focus on the vulnerable population of pediatric intensive care patients. Using a unique approach, they address HAIs in pediatric intensive care by studying several infections rather than a single type, projecting the effects of interventions onto the general patient population, and lastly focusing on both medical and behavioral interventions and comparative effectiveness. The methodology explored is inclusive of simulation, risk analysis, and various statistical techniques. Some of these methods will be familiar to the reader, but the uniqueness of combining these methods in this patient population will be appreciated. Hebert et al. similarly focus on the impact of environments on HAIs but also introduce the very real yet understudied concept of what I would refer to as “hospital geography.” In this article, the potential role of geographic information systems (GIS) for infection control in hospitals is introduced and explored in superb detail. The authors outline the relative challenges of implementation of this rarely used tool including the domains of technology, organization, and adaptation. Notwithstanding its difficulties, GIS has tremendous potential in hospital settings where immunocompromised and vulnerable patients could be well served by this innovation.

Furthering the theme of leveraging environmental design and systems thinking to safeguard vulnerable populations, Papautsky et al. describe the use of human factor approaches to develop and conduct an evaluation of the design of a neonatal intensive care unit. Unique to this approach is the multiple stakeholder engagement early in the development phase by engaging in complex cognitive and collaborative work. In business, this is called incorporating the voice of the customer. In medicine, we often forget the voice of the patient and the providers, and as such, this work by Papautsky et al. is particularly poignant. The applicability of this approach in more generalizable settings is additionally explored relative to the work of Buttigieg et al. whereby such interprofessional approaches are taken to understand the impact of environments in an obstetrical setting relative to provider burnout. Often referred to as the forgotten quality metric, burnout among care teams has broad-ranging implications for patient outcomes. Relationships between perceived patient-safe and patient-friendly environments and unsafe performance relative to burnout are measurable; work environments that were created to ensure safe practices are conducive to preventing burnout among employees.

McGrath et al. expand the concept of systems-based thinking and design relative to the broader patient population that is outside the uniquely identifiable

vulnerable populations we might normally study. Failure to rescue remains a patient safety issue that health care institutions of all sorts and sizes continue to deal with and many resources are used in an attempt to address. McGrath et al. use many system-oriented design and implementation activities to establish design objectives; model clinical processes, workflows, and information systems to have accurate risk assessment tools; and ultimately reduce failure to rescue events in real-world hospital settings. Much of what we know of failure to rescue and ways to assess and warn providers of impending clinical changes comes from clinical monitoring. Horwood et al. take risk assessment deeper into the realm of clinical alarms to explore who actually needs to be monitored in hospital settings while still maintaining the highest patient safety practices. Horwood et al. conduct an in-depth, three-year follow-up from the clinical introduction of standardized guidelines for continuous cardiac monitoring (CCM) across a medical center relative to not only mortality, but also efficiency metrics inclusive of the length of stay. Educational needs for sustainability of such system-wide changes are additionally explored within this longitudinal study. In essence, sustainability in environment and system-based design is fundamental to long-term success and must not be minimized.

While many of our system-based studies relative to patient safety have focused on clinical care units, oftentimes for vulnerable patient populations, there are many processes and non-clinical areas that greatly impact patient safety and quality outcomes. Sterile processing of instruments and the preparation of case carts is a fundamental activity in all health care settings. Furthermore, it is reasonable to conclude that ultimate patient outcomes are completely dependent and even vulnerable to these enabling activities. Albert et al. study sterile processing departments and their embedded processes relative to work systems analysis to provide a framework for interventions and improvements. Human factors elements, operational efficiencies, and environmental changes are explored in this uniquely influential non-patient facing entity.

Much of what we do relative to patient care is reactive. In order to truly influence and sustain system-level change, continuous learning and improvement must become cultural norms. This is an important concept, and one that must be embraced to benefit from this volume's systems-based approach to solutions. Quatman-Yates et al. explore, through an ethnographic report, the cultural elements that must be addressed to cultivate a sustainable culture of continuous improvement. Culture, interestingly enough, is truly three-dimensional and can pivot along the individual, social, and structural axes in complex health care settings. Furthermore, the fourth dimension of continuous improvement has to intersect with systems engineering approaches to both analyze and redesign a reliable system. McGrath et al. leverage the cultural, institutional-level, and reliable design features that are needed in complex care delivery systems. The approach needs to be practical and effective as well as inclusive of truly system-based thinking to effectively address the current shortcomings of our health care design strategies.

The ultimate goal of this volume is to demonstrate the role that systems thinking can play in the design of environments and processes within health care

to improve safety. The patients, families, and providers are at the very core of what we do in health care and must continue to be our True North. Ultimately, why do we focus so intently on health care quality improvement? Firstly, it is the right thing to do. Secondly, we have the capacity and knowledge to improve the environment of care. Lastly, if we were the patient, we would want it. And so, as Hefner et al. so nicely summarize and conclude, it is all about optimizing the patient experience; this is why we take the time to define, measure, analyze, prove, and sustain. We can always do better, and do better we must.

Susan D. Moffatt-Bruce, MD, PhD, MBA, FRCSC
*Department of Surgery and University Hospital Executive Director,
The Ohio State University Wexner Medical Center, USA*