March 28, 2014

To Members of the Franz Edelman Prize Selection Committee:

I commend to you the work of Dr. Eva Lee of Georgia Institute of Technology on a systems approach for transforming emergency department (ED) workflow and patient care of a large urban hospital, Grady Health Systems. The impact of her research on the timeliness and quality of care delivered to emergency department patients as well as on the efficiency with which higher quality care can be delivered has been significant. I am greatly encouraged by the prize committee's recognition of the value and promise of collaborative work between health professionals and experts in OR and systems engineering more broadly focused on the design, analysis, and control of health care delivery processes and systems.

The nation recently received a grade of "D+" for emergency care from the American College of Emergency Physicians. The need for ED redesign and transformation is real. As a safety-net hospital and Level 1 trauma center, Grady Health Systems provides critical services to the broader regional population. I am very impressed by the results of the collaboration between Grady’s ED and Dr. Lee’s team of operations researchers that have enabled the hospital to overcome several extreme health care quality and productivity challenges in recent years and thereby achieve a level of financial viability and stability that appeared unattainable prior to the study. Indeed, the work done at Grady to improve ED workflow and patient care showcases what operations research can contribute at the systems level. I sincerely hope that the accomplishments of and strategies implemented by Grady can now be leveraged by EDs across the nation.

Since the 1990s, professional staff and volunteer experts at the National Academies have worked with many outstanding healthcare organizations in an effort to advance the cause of health systems transformation. Through this work I have come to appreciate just how challenging the task of delivery system transformation can be at different levels of scale. Accordingly I have a great appreciation for what Dr. Lee and Grady Health Systems have achieved.

The Institute of Medicine (IOM) has been documenting and championing the need for the delivery of safer and higher quality health care since the late 1990s. Its 1999 report To Err Is Human raised awareness that there are serious problems with the quality of health care delivery; that these problems stem primarily from poor care delivery systems, not incompetent individuals; and that solving these problems will require fundamental changes in the way care is delivered. A subsequent IOM report, Crossing the Quality Chasm (2000), took up the challenge of suggesting how the health care delivery system should be redesigned. It identified six aims for quality improvement: health care should be safe, effective, patient-centered, timely, efficient, and equitable. The Quality Chasm report and the later IOM report Patient Safety (2004) also
emphasized the need for greater investment in information and communications technologies to enable the delivery of higher quality health care.

In 2005, a joint National Academy of Engineering (NAE)/IOM study, *Building a Better Delivery System: A New Engineering/Health Care Partnership* (2005), called for an engineering approach to the design of health care delivery systems; the authoring committee focused on two interconnected opportunity sets for collaboration between engineers and health care professionals to increase the quality and productivity of health care: (1) system design, analysis, and control tools and associated research to advance understanding of processes and system interactions and improve/optimize dimensions of system performance in the face of constraints, and (2) information and information/communication technologies and associated research to advance connectivity, information flow, and coordination.

The findings and recommendations of the 2005 NAE/IOM report address many of the challenges and opportunities currently facing the nation’s health care delivery system with respect to the optimization, redesign, and continuous improvement of clinical and business processes, physical and IT infrastructure, and the development and deployment of the health professional workforce. Specifically, the authoring committee concluded that tools, techniques, and concepts from the fields of systems engineering, which have found widespread application in other industries, have the potential to transform the quality and productivity of health care. The report documents how systems engineering knowledge and tools including modeling and simulation, queuing theory, SPC, FMEA, and human factors, have been successfully adapted for tactical/localized health care applications to significantly improve quality and productivity performance of discrete processes, units, and departments.

In 2009 and 2011, NAE and IOM teamed up again to publish two workshop reports that built on the findings and recommendations of the *Building a Better Delivery System* report to identify opportunities and insights for applying systems engineering approaches to the delivery of health and wellness services. *Systems Engineering to Improve Traumatic Brain Injury Care in the Military Health System* (2009) identified promising areas for near-, medium-, and long-term applications of operational systems engineering tools and information technologies for modeling, analyzing, designing, and improving the care and management of patients with traumatic brain injury (TBI) throughout the military health care continuum—from battlefield to field hospital to U.S.-based military health care facilities to TRICARE networks and U.S. Department of Veterans Affairs (VA) facilities. And *Engineering a Learning Health System: A Look at the Future* (2010) reviewed transferable lessons from the systems and operations engineering sciences applicable for improving the organization, structure, and function of the delivery, monitoring and change processes in health care—in effect, engineering approaches to continuous feedback and improvement on quality, safety, knowledge, and value in health care.

In August 2012 NAE and IOM launched a joint activity, the Systems Approaches for Improving Health Innovation Collaborative (under the auspices of the IOM Roundtable on Value and Science-Driven Health Care) to directly support and inform practitioners of health systems transformation in an ongoing forum. The project brings together leaders in medicine,
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engineering, and information technology to work with patients and clinicians through face-to-face meetings and virtual collaborations to identify important opportunities for joint action; facilitate joint projects; foster information exchange about successful systems engineering approaches to care improvement; and explore compelling conceptual, evaluation, and research questions.

The Collaborative, of which Dr. Lee is an active member, includes partners in medicine and engineering working on improving patient safety, disease prevention, wellness, and various dimensions of health care quality and value; representatives of health care and wellness institutions with active process reengineering under way; systems engineering and information technology experts; and key change agents and opinion leaders who can move promising results into practice.

Given my institution’s longstanding commitment to harnessing OR and systems engineering concepts and techniques to transform health and health care in the United States, and my own deep appreciation for the many challenges involved, I find it particularly fitting that Dr. Lee should be selected as finalist in the Franz Edelman Prize competition. I applaud the prize committee for recognizing the important impact Dr. Lee’s work and that of a growing community of talented experts in OR and systems engineering in partnership with dedicated health professionals has had and will continue to have on the nation's health care sector and the lives of patients in general.

Sincerely yours,

Proctor P. Reid, Ph.D.  
Co-Director, NAE-IOM Systems Approaches to Health Innovation Collaborative  
Director of Programs  
National Academy of Engineering