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Health care O.R.

Concerns over timely access to services and patient safety, rising costs and need to transform systems create booming field for operations research.

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By Brian Denton and Vedat Verter

The health sector accounts for a significant portion of the gross domestic product (GDP) in the United States, Canada and many countries around the world. For example, health care expenditures in the United States accounted for 16 percent of the GDP in 2007, and the health sector has ranked consistently among the top three sectors contributing to Canada's GDP for the past five years. Fostered by the aging population and the shortage of physicians and nurses, timely access to health services has become increasingly difficult, and the congestion at health care facilities has reached unprecedented levels. Coupled with the increasing concerns about patient safety and the growing costs of health care, these constitute formidable challenges for health care providers and policy makers.

Recognizing the need to transform health care systems, many governments around the globe have

spent considerable effort on changing health policies during the past decade. For example, the recent health reform in the United States seeks to reduce the number of uninsured people. Another example is the patient wait-time guarantees for cancer care, hip and knee replacement, cardiac care, diagnostic imaging, cataract surgery and primary care that were announced in 2007 by the Canadian government.

Developments at the governmental level are necessary but not sufficient for achieving tangible success on the ground. To increase the long-term efficiency, effectiveness and quality of health care delivery, health care providers, insurers and policy-makers need a solid understanding of the operational impact of their strategies. Also, policies must be implemented in a way that incentivizes improvements to patient health outcomes while at the same time achieving sustainable changes at the operational level.

Health care processes are dynamic and complex systems. Their design and improvement often involve pushing the frontiers of research. Practitioners and policy-maker are increasingly recognizing operations research as an important tool for affecting change in the health care industry. Meanwhile the unique challenges presented by the health sector are helping transform the field of O.R., presenting new opportunities to use existing methods and fostering the development of new methodologies.

Health care O.R. is certainly not a new field. As far back as 1980, more than a hundred scholarly publications focused on the use of O.R. and decision analytic methods for the design and improvement of health services [1, 2]. The EURO Working Group on Operational Research Applied to Health Services (ORAHS) has been organizing annual meetings since 1975 focusing on the application of systematic and quantitative analysis in health care. Despite these early efforts, the health sector is lagging behind other service industries (such as airlines, hotel chains, and retail) in the adoption of the most recent information, communication and decision support technologies. In the information technology arena, for example, the development of electronic health records has been the primary focus. However, the effective use of the resulting information to make decisions has received much less attention. The history of O.R. successes in other service industries suggests that there is significant potential to achieve improvements in health care.

Current research initiatives in health care are expanding the breadth of application areas for O.R. Early research mostly concentrated on the challenges of strategic and operational planning of health services within hospitals. However, the increasing trend of delivering health care outside hospitals, in the outpatient setting, has generated new challenges, leading to many new research directions. Recent research has also pushed the boundaries of knowledge about medical decision-making. Journals such as *Medical Decision Making,* first published in 1981, frequently publish the results of studies that employ O.R. methodologies, such as decision analysis and simulation, to medicine. O.R. journals are increasingly publishing new applications and methodological advances applied to medical decision-making in areas such as cancer treatment, epilepsy, stroke prevention, heart disease and liver transplantation. In addition, the plethora of problems that need to be tackled in delivering health care in developing countries is finding important new applications of O.R. An over-arching characteristic that differentiates the new generation of research from the past is its multi-disciplinary nature.

In response to the growing needs for improvements in health care delivery, many INFORMS members have engaged in academic research and the development of best practices. Health care O.R. is becoming recognized as an important part of the O.R. field, with its own specialized journals. For instance, in 2010, *Health Care Management Science* published its 13th volume, a new journal, IIE Transactions on Health Care Systems Engineering was launched, and the *Production and Operations Management* journal created a new department on health care operations. Some of the leading O.R. journals have been responding to this growth in interest with special issues on health care including *Operations Research* (2008), *Interfaces* (2009) and a special issue of *Production and Operations Management* to be published soon.

Recent INFORMS conferences have seen a dramatic rise in the number of talks related to health care. The 2009 INFORMS meeting in San Diego, Calif., included more than 250 talks related to health care. This was a large increase over the previous year, and it continues a pattern of rapid growth over the last decade. Health care-related talks were sponsored by a number of sections and societies at the San Diego meeting, including the INFORMS Health Applications Section (HAS), the Computing Society, the

Manufacturing and Service Operations Management Society (MSOM) and the Quality Statistics and Reliability (QSR) Section. The above figure depicts the total number of talks based on a keyword search of past INFORMS annual conference programs.

The upcoming INFORMS Healthcare 2011 meeting in Montreal (see accompanying story) will bring together health care researchers from different sections/subdivisions of INFORMS, as well as other professional societies, to discuss the current challenges faced by the health sector and the most important avenues for future research. The Canadian Operations Research Society (CORS), the Institute for Industrial Engineering Society for Health Systems (IIE SHS), the Production and Operations Management Society College of Healthcare Operations Management (POMS CHOM) and ORAHS will be among the sponsored cluster organizers at INFORMS Healthcare 2011.

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INFORMS introduces health care conference

INFORMS will introduce a new, highly focused brand of conference next year with a three-day meeting on the health sector, aimed at bringing health care researchers and stakeholders together. INFORMS Healthcare 2011 will be held June 20-22 at the Hilton Bonaventure Hotel in Montreal, Canada. The conference will combine the deep research focus of a traditional INFORMS meeting with an emphasis on real-world application that distinguishes the INFORMS practitioner conference.

General Chair Vedat Verter, professor of Operations Management at McGill University, has formed an Organizing Committee of respected OR/MS professionals, including Diwakar Gupta from University of Minnesota, Beste Kucukyazici of MIT-Zaragoza, Eva K. Lee of Georgia Tech and Sergei Savin of The Wharton School.

The preliminary list of sponsored clusters includes INFORMS communities such as the Health Applications Section and MSOM-SIG on Healthcare Operations Management, as well as several key societies outside INFORMS. The Canadian Operational Research Society, IIE Health Systems Society, POMS College of Health care Operations Management and the EURO working group on Operational Research Applied to Health Services are among the organizations participating in the program.

In addition, invited clusters on topics such as medical decision-making, computational optimization, putting IE/OR into practice and other current topics are being organized. With presentations by researchers and practitioners from the United States, Canada, Europe and around the world, the conference will offer a cross-cultural view of health care systems.

In order to ensure high-quality presentations, all submissions will be reviewed. Authors are invited to submit in a choice of formats – either for oral presentation or for interactive poster sessions – and must submit a two-page extended abstract, as well as a 50-word summary, by Feb. 1, 2011.

Several structured networking techniques that are popular at the INFORMS practitioner conference will be incorporated into the program. Birds-of-a-feather discussion groups will focus on defined topics, and networking tables facilitated by conference organizers will encourage exchange.

The conference venue, the Hilton Bonaventure Hotel, is an urban resort with 2-plus acres of rooftop gardens, right in the heart of downtown Montreal. The discounted INFORMS hotel rate of $185 includes Internet access, heated pool and fitness club.

For complete information and to submit an abstract, visit:
http://meetings2.informs.org/healthcare2011/ (http://meetings2.informs.org/healthcare2011/) .

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