



Editorial

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This special issue of the *Journal of the Operational Research Society* (JORS) on *Health Systems Operations Research* was announced at the INFORMS Healthcare 2011 inaugural thematic meeting that was held in Montreal. We received 28 submissions to the call for papers—that did not require participation at the conference—by the submission deadline of 1 January 2012.

The first three papers focus on problems arising in the *delivery of primary care services*. The next two papers focus on *hospital operations*, whereas the final three papers study different aspects of health care. The sixth paper is concerned with radiation therapy dose optimization. The seventh paper identifies static dispatching rules that work well for managing large-scale emergency medical systems. Finally, the last paper focuses on a risk-sharing agreement between a payer and a drug manufacturer when the treatment has mixed results with some patients benefiting from the treatment and others not. We briefly summarize each paper next.

The first paper was handled by Thomas Archibald, co-Editor of JORS, since it is co-authored by one of the guest editors of this special issue. Entitled ‘Matching Patient and Physician Preferences in Designing a Primary Care Facility Network’, this paper deals with the design of primary care facilities network, viewed from the vantage point of a central planner. The authors argue that central planners need to take into account the patients’ as well as physicians’ preferences when locating health-care facilities. Many existing models consider patients’ point of view by choosing locations that result in better access for patients across the planning region, but fail to recognize physicians’ concerns that may centre around income and workload, equity, and having professional support and collegial environment. The authors formulate the problem as a discrete optimization problem with different objectives depending on the perspective of the planner. They solve a number of scenarios based on Turkish data to find both insights and practical solutions that perform well on multiple objectives. This study helps planners balance the need to make allocations attractive to physicians and the locations closer to more patients in the planning region. Because physicians require a minimum size of patient panels to find the clinic assignment financially attractive, adding more physicians in the model may require assigning patients from areas that are farther away to certain clinics, resulting in poorer access.

The second paper titled ‘A Simulation Case Study to Improve Staffing Decisions at Mass Immunization Clinics (MIC) for Pandemic Influenza’ considers the problem of choosing the size of MIC workforce in the event of a pandemic. Previous studies in this stream of research have not considered the fact that patients may get infected while waiting for immunization. Although adding more health care workers reduces wait times, it takes resources away from other health-care facilities. The authors develop a detailed discrete-event simulation model to study the impact of adding staff to MICs at different stages of progression of the pandemic. Using data from Canadian cities that responded to the 2009 H1N1 pandemic, the authors report that the marginal benefit of adding staff to MICs is greatly underestimated if indirect waiting and intra-facility infections are ignored.

The third paper titled ‘Outpatient Appointment Scheduling in Presence of Seasonal Walk-Ins’ considers the problem of designing appointment scheduling systems in presence of walk-ins. The authors decompose the problem into two components—(1) selecting access rules and (2) choosing appointment rules. The former refers to decisions such as the number of patients to schedule in a particular period (also known as booking limit) and thus the capacity left aside to take care of walk-ins, which in case of seasonal walk-ins is varied by the time of the year. The second component refers to booking of particular appointments in particular slots, or leaving open of certain slots to accommodate walk-ins, to balance the workload throughout the day. The authors use a simulation methodology to identify best combinations of access and appointment rules that work well in the presence of seasonal walk-ins.

The next two papers concern different aspects of hospital operations. In the fourth paper titled ‘Modeling Length of Stay and Patient Flows: Methodological Case Studies from the UK Neonatal Care Services’, the authors evaluate and compare three different methodologies for building descriptive models of length-of-stay modelling, physical patient pathways, and systems dynamics modelling. The paper evaluates the usefulness of these techniques in assessing major drivers of inefficiencies in patient flow. The fifth paper titled ‘A Robust Approach for Scheduling in Hospitals Using Multiple Objectives’ is concerned with the allocation of operating room time to surgical services in the form of surgical blocks. The paper focuses on different objectives of different stakeholders in a multi-criteria optimization model. The authors test calculated schedules by considering randomly generated scenarios for surgery times and emergencies. They show that their resulting objective function values are close to individually optimal

values while ensuring a high rate of utilization and a low amount of overtime.

The first five papers can be categorized by the fact that they focus on either primary care or hospital operations. The remaining three papers are more diverse and consider problems of a different scope. The first of these three papers, that is, the sixth paper in this special issue titled 'Biologically Guided Intensity Modulated Radiation Therapy Planning Optimization with Fraction Size Dose Constraints', proposes a dynamic optimization of radiation doses across time based on the biological responses of the tumour points. The mixed integer linear programming formulation and solution presented in the paper generates treatment plans reacting to tumour biology before treatment, as well as to the changing tumour biology throughout the treatment while satisfying both cumulative and fraction-size dose constraints. The paper shows that biologically optimized plans improve on tumour control obtained from following traditional plans that ignore biology.

The seventh paper considers how best to dispatch emergency medical services (EMS) crew and vehicles to minimize response time. The authors consider dispatching policies that incorporate the severity of calls in order to increase the survival probability of patients. A simulation model is developed to evaluate the performance of EMS systems. Performance is measured in terms of patients' survival probability. Different response strategies are proposed and evaluated. The authors show that dispatching the closest vehicle is not always optimal

and dispatching vehicles considering priority of the call leads to an increase in the average survival probability of patients.

Finally, the eighth paper considers the problem faced by a payer, either an insurance company or a national health system payer, who needs to decide on the terms of a risk-sharing contract, in particular the amount of rebate from a drug manufacturer when the drug is costly and not always effective. The manufacturer, by agreeing to offer a rebate, shares the risk and increases adoption of its drug. The payer clearly benefits by reducing its cost if the drug turns out to be ineffective.

The papers described above represent cutting-edge research in the area of health-care operations research/management. We hope that this collection of works will help spur future advances that make health-care delivery systems more effective in improving patients' health. In closing, we are grateful to Thomas Archibald and Jonathan Crook, the co-Editors of *JORS*, for giving us the opportunity to put together this special issue, and Sarah Parry for her editorial assistance. We also appreciate the support of the referees in evaluating the submitted manuscripts. Last but not least, our thanks goes to the authors whose submissions made this special issue project a reality.

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