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Among the many fields where operations research and computers meet, health care delivery is surely one of the more vital nowadays. Health care delivery is a very relevant topic not only from the point of view of researchers, scholars and practitioners but also for the impact on public opinion and for fueling large discussions and debates. The most challenging aspect in health care delivery stems from the high complexity of the system itself, its intrinsic uncertainty and its dynamic nature. Their management requires not only the expertise to analyze and to understand a large amount of information but also to organize that information on a cognitive base for adequate decision making and to promote a collaboration with researchers in other areas, such as doctors and economists. This special issue of "Computers and Operations Research" is intended to collect high quality papers on the most recent contributions of operations research techniques to health care delivery.

Usually, health care papers report solutions about case studies. Indeed, authors often start their studies from a real problem proposing a solution approach usually tested on real data coming from an health care delivery institution. On the contrary, in this special issue, the leading editorial policy aims at selecting papers reporting a hard contribution in terms of OR methodology and computational issue. We also take into account papers dealing with real case studies, i.e., those studies reporting a positive influence when dealing with a real problem.

The authors of 70 papers answered our call for papers. Following the above policy, only 38 papers were put in the review process asking for a reviewer report to 3 reviewers for each paper. After the first review round, 22 papers were rejected. Among the remaining 16 papers, we decided also to give a second chance to those papers which have received diverging recommendations. At the end of this process, we selected 8 papers whose common feature is to support informed decisions at strategic, tactical and

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operational levels.

A bunch of 3 papers deal with the optimization problems arising in the intensity modulated radiation therapy (IMRT) treatment planning. Intensity-Modulated Radiation Therapy is the technique of delivering radiation to cancer patients by using non-uniform radiation fields from selected angles, with the aim of reducing the intensity of the beams that go through critical structures while reaching the dose prescription in the target volume. Two decisions are of fundamental importance: to select the beam angles and to compute the intensity of the beams used to deliver the radiation to the patientThe first 2 papers deal with the second problem, called fluence map optimization, providing two alternative approaches. Aleman *et. al.* evaluates the computational enhancements gained by applying different types of line search strategies and different types of warm-start techniques also adopting parallelism-enhanced algorithm. Taşkin *et. al.* exploits the fact that, from a mathematical point of view, the problem is equivalent to a minimum cardinality matrix decomposition problem. The authors propose a combinatorial Benders decomposition approach to solve this problem to optimality. The last paper, by Cacchiani *et. al.* face the problem of optimizing both the decisions, developing an algorithm which automatically selects the beam angles and computes the beam intensities. The authors propose a hybrid heuristic method, which combines a simulated annealing procedure with the knowledge of the gradient.

One of the major problem arising in hospital planning is that concerning operating room planning. The paper by Demeulemeester *et. al.* faces this problem proposing a multilevel integrative approach based on mathematical programming modeling and simulation analysis. It consists of three stages, namely the case mix planning phase, the master surgery scheduling phase and the operational performance evaluation phase to advance both the hospital resource efficiency and the health care service level.

Two papers use simulation modeling in order to address the evaluation of different health care delivery strategies. The paper by Churilov *et. al.* deals with decision support in pre-hospital stroke care operations. Stroke is the third most common cause of death and the sixth most common cause of disability worldwide. The time from stroke onset to arrival to hospital has been identified as the single most important issue in determining patients' eligibility for stroke thrombolysis. There is a need for simultaneous systemic evaluation of multi-factorial interventions in pre- hospital acute care systems, aimed at increasing patients' eligibility for stroke thrombolysis. The authors propose a solution that provides clear measure of the relative benefit of alternative potential interventions working with the Victorian Stroke Clinical Network, Australia: they recognizes the value of the proposed solution in supporting its policy development activities, in particular, in support of formulating stroke public awareness campaigns (in partnership with the National Stroke Foundation) and in planning decisions regarding availability of thrombolysis treatment services in regional areas. On the other side, the paper by Mecoli *et. al.* adopted System Dynamics methodology to evaluate control strategies for mosquito-borne diseases spread by human travel. The authors take into account the case of *Aedes albopictus* mosquito (the "Asian Tiger"): this mosquito, which has become established in southern Europe in recent years, is a vector for many

diseases. Since the flight range of mosquitoes is very limited, diseases can only be spread from one region to another by human travel. The paper uses a system dynamics model, the Multi Region Model (MRM), developed by the authors, to study the spread of a chikungunya epidemic between two typical southern European regions. The model uses data from the outbreak that occurred in Italy in 2007.

Somehow connected to the previous paper, the paper by Dimitrov *et. al.* deals with the problem of selecting intervention strategies to control malaria. Malaria continues to be a great burden on both morbidity and mortality as well as economic development across the world. In highly endemic areas, such as Nigeria, malaria can claim hundreds of thousands of lives and millions of dollars yearly. The authors propose a top-down approach who combines models for intervention cost-effectiveness, disease burden, and intervention delivery to create a single large-scale geographic optimization determining a detailed geographic intervention plans, identifies key budget values and specifies the locations of the supply distribution centers. A case study of Malaria in Nigeria illustrate the approach.

Finally, the last paper by Mitropoulos *et. al.* deals with one of the most important activities of strategic planning in a health-care system, i.e., the effective allocation of scarce health care resources. The study starts from the need of developing systematic models and evaluation methods that will support a strategic planning process that addresses issues such as the location of services and the effective use of resources such as equipment, funds or workforce. The authors propose a methodology that takes into account health service provider efficiencies based on multiple measures through DEA. These efficiencies are then employed to determine health providers' locations and service allocations, which include new services distribution as well as existing services redistribution.

Although the eight papers are not enough to draw statistical conclusions, they demonstrate how much health care optimization problems are challenging and often require to adopt unconventional combination of solution methodologies. We hope that this special issue will encourage members of the operations research community to contribute to this important field.

We wish to express our appreciation to all the authors who submitted their papers. We also wish to express our gratitude to all the reviewers who provided constructive comments and suggestions, and helped improve the quality of the papers. Finally, we would like to thank the Editor-in-Chief, Professor Stefan Nickel, for his support and encouragement.