Healthcare Modeling Foreword

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Foreword

In addition to the tremendous growth in operations research and management science applied to health care in the last several years there has been growth in the impact of such research in public policy and decision-making. The goal of this special issue was to compile state-of-the-art research on modeling, theory, empirical studies, and applications in health care. This issue contains nine contributions covering healthcare operations, health policy, and decision models based on disease progression and transmission models.

In their paper "Impact of Treatment Heterogeneity on Drug Resistance and Supply Chain Costs", Spiliotopoulou and colleagues develop an innovative disease transmission model to study the spread of resistant drug-strains through a population. They add a supply chain component to their model to investigate the tradeoffs between operational costs and the costs associated with drug resistance. An important conclusion of their analysis is that when disease severity is high and drug prices are low, it is optimal to use a wide assortment of drugs.

In "Use of a Markov Decision Process Model for Treatment Selection in an Asymptomatic Disease with Consideration of Risk Sensitivity", Tilson and Tilson analyze treatment decisions for an individual with an asymptomatic disease. They use a Markov Decision Process model and demonstrate that incorporating risk sensitivity considerations can result in no-treatment recommendations, when a QALY-based approach recommends intervention.

Silberholz and colleagues use a simulation model to explore the relationship between service time and the presence of medical residents in an emergency department in "The Impact of the Residency Teaching Model on the Efficiency of the Emergency Department at an Academic Center". Their analysis suggests that residents improve emergency department efficiency by reducing waiting and treatment times, particularly for more severe patients.

Bard and colleagues investigate scheduling models for traveling therapists who provide home care and residential therapy at many different locations. In "Weekly Scheduling Models for Traveling Therapists", they develop heuristics that provide near optimal solutions in a set of sample problems and show how the cost of a schedule varies in the number of

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patient visits per week, number of therapists considered, and number of home bases for therapists.

In "Sequential Clinical Scheduling with Patient No-show: The Impact of Pre-defined Slot Structures", Chakraborty and colleagues study a clinic appointment scheduling problem in which service durations are random and some customers do not show up for their appointments. They demonstrate that shorter appointment slot lengths lead to greater scheduling flexibility and hence better overall performance.

In "Multi-period Layout Planning for Hospital Wards", Arnolds and Nickel address the issue relevant in some modern hospital designs where some walls can be shifted in response to changes in demand patterns. They formulate the "Variable Ward Layout Problem" and illustrate with several examples.

Iacocca and colleagues investigate factors affecting the wholesale acquisition cost of 2000 brand name drugs in the United States in their paper "A Multiple Regression Model to Explain the Cost of Brand-Drugs". They show that the number of dosing levels of a drug and the number of years since FDA approval affect drug price, but that price is not affected by the number of generic or brand name drugs in a class.

In their paper "Optimal administrative geographies: an algorithmic approach", Datta and colleagues formulate a multi-objective optimization problem to partition a region of England into health authorities. They address the problem using a genetic algorithm and show important trade-offs between size of partition or population homogeneity, and sharing boundaries with other local authorities.

In "Impact of Conversion to Critical Access Hospital Status on Hospital Efficiency", Nedelea and Fannin develop a novel method, using data envelopment analysis and regression, to estimate the impact of conversion to Critical Access Hospital status on three measures of efficiency. They found that hospitals that converted to Critical Access Hospital status were slightly less allocatively efficient and more technically efficient than they were before conversion; and that, compared to hospitals that had not converted, these hospitals were less cost-efficient and less allocatively efficient.

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