The value of flexibility in shift scheduling of physicians at hospitals – A column generation heuristic
Dr. Jens Brunner

Abstract

Scheduling physicians is a relevant topic in hospitals. Heterogeneous demand and 24/7 service make the problem challenging. Approaches in the literature use flexible shift patterns to match demand with scarce resources. In these approaches, demand is usually assumed to be deterministic. However, surgery durations and emergency arrivals both contain uncertainty leading to massive staff overtime. We introduce stochastic demand for physicians using a scenario-based approach. To incorporate this in scheduling, we allow variable shift extensions. If a variable shift extension is scheduled, the physician knows that with a given probability he or she may have to work few periods longer. Thus, we ensure matching supply with demand and at the same time we increase predictability of working hours. We propose a mixed-integer linear program and a column generation heuristic to solve our problem. We evaluate the model using experimental data from a German university hospital. We can demonstrate that our approach manages to reduce unplanned overtime by more than 80 per cent with a constant workforce. In cases of similar levels of unplanned overtime, the required workforce level may be decreased by 20%.

Refreshments will be served in Daniels Hall room 428
Student Lounge from 11:15 a.m. to 11:45 a.m.
Dr. Jens Brunner  
Professor of Health Care Operations/Health Information Management  
University of Augsburg  

Biography

Jens Brunner has been permanently appointed as Professor of Health Care Operations/Health Information Management at the Faculty of Business and Economics at the University of Augsburg in March 2013. Since July 2014 he is director of the University Center for Health Care at Klinikum Augsburg (UNIKA-T) and since October 2015 he is responsible for the international relations at the Faculty of Business and Economics.

He received a PhD from the TUM School of Management in 2009 and a diploma degree in Business Administration from the University of Mannheim in 2006. Before coming to the University of Augsburg, he worked at the University of Mannheim and at the TUM School of Management. Professor Brunner teaches courses in service operations management, modeling and optimization, integer programming, and health care management. His research interests center on design and analysis of service systems using quantitative methods. A special focus is on processes in health care. His work has been published in IIE Transaction, Health Care Management Science, European Journal of Operational Research, etc. In 2015, Professor Brunner and colleagues have been awarded by the Harold W. Kuhn Award for the best published paper in Naval Research Logistics.