



Research School for Operations
Management and Logistics

Tactical and Operational Hospital Resource Planning and Scheduling with Hard and Soft Constraints

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Demand for healthcare services is continually increasing, while higher patient expectations and stringent requirements from governments and insurance companies have put pressure on hospitals to work more efficiently with available resources. Besides the economic aspects, hospital resource planning and scheduling has direct impact on quality of performance, waiting times for patients, and job satisfaction of the staff. Because of variability and stochasticity of individual treatments and services, the planning and scheduling of major resources – such as operating rooms, capital medical equipment, beds, and nurses – is a complex problem. The resource allocation problem is more difficult when there are multiple hard/soft constraints involved. Hard-constraints are a set of legal or institutional requirements, e.g., a nurse is not allowed to monitor patients while setting up a patient for a treatment session. Soft-constraints on the other hand represent preferences, e.g., a nurse cannot monitor more than four patients simultaneously. Soft constraints may be violated to some limit or with defined weighted penalties. This project focuses on Specialty Care environments where both patients' and care providers' preferences need attention. The goal is to come up with meta-heuristics for deterministic and stochastic conditions through optimization of small-scale problems.