

## ***Emergency Room Scheduling featuring Optimization of Intra-hospital Routing***

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Operating theatres range among the most cost-intensive units of any hospital. Hence from a cost-perspective it is crucial to manage the associated resources efficiently when constructing schedules, as it has a major impact on the performance of the hospitals as a whole. On the other hand side it is important to consider patient satisfaction as well. Hospitalized patients typically have to undergo several treatments and examinations before their actual surgery. In order to get to their appointments they are escorted by designated medical staff (porters). Porters accompany patients from their ward to the corresponding hospital unit(s) and escort them back afterwards. In order to minimize the patients' inconvenience those appointments (including the surgery) should be scheduled tightly such that the resulting cycle time is minimized. Capacities of porters, operating theatres and examination rooms should be managed efficiently and the resulting schedules need to be feasible in terms of the capacities available. In this talk we will present a novel problem formulation for an interesting combinatorial optimization problem combining the above-mentioned features from scheduling and routing, while minimizing client (i.e. patient)-centered objectives such as their perceived inconvenience. Traditionally the resulting sub-problems have been modeled and solved independently. We are going to show however that it is crucial to solve the resulting problem simultaneously in order to obtain high-quality solutions. The usage of exact methods for solving the problem at hand in a reasonable amount of time is limited to very small-sized problem instances only. Hence we will present a hybrid metaheuristic which has been developed and applied successfully for solving real-world sized instances. The method itself is inspired by concepts coming from Large Neighborhood Search (LNS). It iteratively solves the underlying subproblems in both a metaheuristic - and if applicable - exact fashion. The embedded components are able to exchange information, and hence to guide the solution process of their counterpart, which in turn allows obtaining high-quality solutions in a reasonable amount of runtime. Our experiments show that the solution quality obtained can be improved substantially when considering routing and scheduling aspects simultaneously.