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## The effect of physician rescheduling on plan stability and plan quality within a decision support system for hospitals

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**Abstract** The problem of physician scheduling is complex. The body of research on this topic is abundant. However, no prior research exists on the rescheduling of physicians in case of unexpected absences. The complexity of this problem surpasses the complexity of initial plan generation. We present a mixed-integer linear program to reschedule physicians' duties and workstation assignments. Our model allows management to make a trade-off between plan stability and plan quality in terms of coverage, fairness, physician preferences and training. Data provided by our partner hospital is used to test our model

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on real-life problem instances. In our case study we schedule 133 physicians to 17 duties and 20 workstations with varying demand. During our 4-week planning horizon, we process 383 physician preferences for a certain duty or for no duty. First, we create an initial plan for our planning horizon. Afterwards, we randomly generate new absences on each day of our planning horizon and run the rescheduling model to create an updated plan. 10 iterations of our model are run with 3 different cost settings each, resulting in a total of 840 rescheduling model runs. Each model run takes between 13 and 24 seconds. Our results provide insights into the cost values to use to balance plan stability and plan quality. We believe that these insights can assist hospitals in making timely rescheduling decisions in case of unexpected absences. Our model is scheduled to be integrated into a personnel scheduling tool at our partner hospital. We present the main features of this sophisticated software which was developed by us in cooperation with a software development company.

**Keywords** OR in health services · Physician Rescheduling · Online planning · Mixed-integer linear program