

## Improving Patient-Care Services at an Oncology Center with a Flexible Adaptive Scheduling Procedure

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**Abstract :** This work presents an online scheduling problem which accommodates multiple requests of patients for chemotherapy treatments in a cancer center of a major metropolitan hospital in Canada. To solve the problem, an adaptive flexible approach is proposed which systematically combines two optimization models. The first model is intended to dynamically schedule arriving requests in the form of waiting lists whereas the second model is used to reschedule the already booked patients with the goal of finding better resource allocations when new information becomes available. Both models are created as mixed integer programming formulations. Various controllable and flexible parameters such as deviating the prescribed target dates by a pre-determined threshold, changing the start time of already booked appointments and the maximum number of appointments to move in the schedule are included in the proposed approach to have sufficient degrees of flexibility in handling arrival requests and unexpected changes. Several computational experiments are conducted to evaluate the performance of the proposed approach using historical data provided by the oncology clinic. Our approach achieves outstandingly better results as compared to those of the scheduling system being used in practice. Moreover, several analyses are conducted to evaluate the effect of considering different levels of flexibility on the obtained results and to assess the performance of the proposed approach in dealing with last-minute changes. We strongly believe that the proposed flexible adaptive approach is very well-suited for implementation at the clinic to provide better patient-care services and to utilize available resource more efficiently.

**Keywords :** chemotherapy scheduling, multi-appointment modeling, optimization of resources, satisfaction of patients, mixed integer programming

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