
Home Chemotherapy Planning: An Integrated Production Scheduling and Multi-Trip Vehicle Routing Problem

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Abstract

Home chemotherapy (HC) services aim to assist cancer patients enabling them to remain comfortable at home. This is currently a rising trend, and it should be encouraged when the patient's conditions are favorable. HC services imply both the production and the administration of drugs to patients. These activities are run in parallel and must be carefully synchronized due to short lifespan of drugs and limited resources. In order to efficiently plan these activities at the operational level, two well known and hard problems, scheduling and routing, need to be solved as a whole, rising challenging synchronization issues to be addressed.

We consider a set of patients that must be visited by a set of nurses for administration of a personalized drug. Nurses are allowed to come back to the hospital and get new produced drug thus performing multiple serving trips. The drug is produced right before delivery by a set of the technicians in the hospital pharmacy.

We propose to use a large neighborhood search heuristic that iteratively removes and reinserts production and/or drug administration operations to create new solutions. Three destroy and recreate operators are considered: 1) production operations are removed and reinserted 2) drug administration operations are removed and reinserted 3) both types of operations are removed and reinserted to modify the complete solution.

Ad-hoc mathematical programming based operators are developed to re-optimize the current solution.

The algorithm is tested on new instances created based on discussion with Belgium hospitals.

Keywords: Home chemotherapy, Meta, heuristic, Integrated problems

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