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A model for scheduling drug deliveries in a french homecare[1]

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Abstract

In this paper, we deal with a drug delivery problem in a French homecare. The carriers are assigned to specific areas and must visit each patient once a day while minimizing the total travelled distance. In this context, we propose to explore four strategies of delivery: (i) starting deliveries when a specified number of deliveries is achieved, (ii) starting deliveries if a specified distance is reached regarding to the planned deliveries, (iii) starting deliveries on a fixed number of deliveries per carrier and, (vi) starting deliveries on fixed hours. We introduce a mixed linear program which takes into account various constraints and minimize the total travelled distance. The results obtained for each strategy are compared in order to identify which one is the most efficient to solve the drug delivery problem at the homecare.

Key words: Integer programming, vehicle routing problem, staff scheduling, drug delivery, homecare logistic.

1 Introduction

"Soins et santé" is a homecare based in Lyon (France). It was created since 1972 and is, from June 2007, the only French homecare which has its own pharmacy. Thus, this structure must face several delivery problems. It is difficult to schedule regular deliveries with only four carriers taking into account urgent prescriptions which arrive at any time and must be treated rapidly whereas all carriers are gone. Moreover, the pharmacy does not have any decision support tool to establish the planning of deliveries along the week. In fact, deliveries schedule consists in daily assigning an area to each carrier where he must visit each patient respecting their time windows and achieving all the deliveries into his working hours. In this context, we propose a decision support tool based on mixed integer programming which takes into account various constraints and minimize the total travelled distance. The following sections are structured as follow. First, we describe the delivery problem of the homecare. Second, we present some previous works which deal with delivery problems, vehicle routing problem, and transportation scheduling problems. In a third part, we propose a mathematical formulation for scheduling deliveries. Next, we proceed to an analysis of the results obtained for the data of the homecare

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