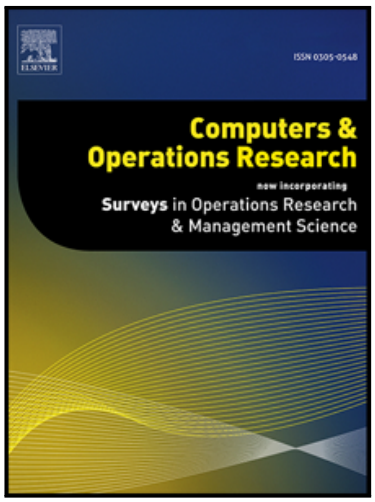

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A Two-Stage Multi-Echelon Stochastic Blood Supply Chain Problem

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Abstract

This paper presents a two-stage stochastic mathematical model for red blood cells that accounts for the production, inventory and location decisions. The tri-objective model aims to reduce the number of outdates, system costs and blood delivery time simultaneously. The problem is solved using CPLEX for a real case study from The Hashemite Kingdom of Jordan, and managerial insights were drawn from computational experiments.

Keywords: Stochastic programming; perishable products; inventory management; facility location; blood supply chains; red blood cells.

1. Introduction

Having a ready blood supply on hand is essential especially in cases of medical emergencies and procedures. Generally, blood supply chains (BSCs) include collection, processing, distribution, storage and supply of blood components. Blood components include red blood cells (RBCs), platelets, white blood cells, and plasma. Of these blood components, RBCs, platelets, and plasma are useful for transfusion, each having its own uses and benefits. These blood components differ in terms of their