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A Two-Stage Stochastic Programming Model for Inventory Management in the Blood Supply Chain

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Abstract

Managing inventories in the blood supply chain is a challenging task, mainly due to the uncertain nature of the demand for blood units, the perishable nature of the blood, and a strong subjective bias towards criteria other than cost minimisation. In this paper, we propose a two-stage stochastic programming model for defining optimal periodic review policies for red blood cells inventory management that focus on minimising operational costs, as well as blood shortage and wastage due to outdating, taking into account perishability and demand uncertainty. The adoption of this framework allows the consideration of more general stochastic processes to model the demand uncertainty than approaches currently available in literature. Moreover, this framework renders a model that can be solved efficiently by general purpose off-the-shelf optimisation software. To illustrate the potential benefits

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