

A META-MODEL FOR A REGIONAL BLOOD BANKING SYSTEM

by

HARRY YEN* AND WILLIAM P. PIERSKALLA**

Abstract

A computer simulation model for a regional blood banking system was constructed. The inter-related storage, transshipment and ordering functions were built in the model. Provisions were made to allow for the return of unused demands, the disposal of outdated stock, the transshipment of inventory among local blood banks to reduce shortage and outdate, and the limited supply to the central blood bank.

Due to the numerous possible combinations of the input variables, a full factorial or even partial factorial sensitivity analysis would be very expensive. For this reason a meta-model which approximates the simulation model was constructed. The independent variables of the meta-model are: the number and size of hospital blood banks in the system, the inventory levels at all locations, the probability of return and the time lapse before return. The dependent variables of the meta-model are: The shortage quantity and outdate quantity of the system. The work is in progress to test the validity of the meta-model in terms of the input and output variables. In some early analysis the predictions of the two dependent variables from the meta-model have been found to be consistent with the values from the simulation model.

One of the objectives of this continuing research is to provide a shortage-outdate input model to a full regional blood banking model which allows for organizational change, facilities location and allocation, and transportation and quality control. The work has also begun on this latter phase of the problem.

*Office of Operations Research, Michael Reese Hospital and Medical Center, Chicago, Illinois 60616.

**Department of Industrial Engineering and Management Science, Northwestern University, Evanston, Illinois 60201.