using standard computer packages. Part Three then describes the author's formulations and discusses the reasons behind them, and Part Four gives the solutions.

The only disappointment I felt about this excellent book was that dynamic programming was not covered. The author explains that he is considering model building using only standard computer packages, which therefore limited him to linear, separable and integer programming. However, both students and teachers of courses on mathematical programming should find this a valuable textbook, since it raises model building and the application of O.R. techniques to a level of academic respectability!

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Emergency Medical Systems Analysis

THOMAS R. WILLEMAIN and RICHARD C. LARSON (Editors)

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THIS is the fourth and final volume published under the overall project heading of Innovative Resource Planning in Urban Public Safety Systems, which was carried out by the Massachusetts Institute of Technology (the previous three volumes deal with the police service). It comprises a set of eight papers on the planning and evaluation of emergency medical services, focussing particularly on the ambulance service.

The first paper provides a good discussion of performance measures and their limitations. The difficulty of using outcome measures is illustrated by critically appraising the literature on salvageable deaths from automobile accidents. Two papers that follow report the results of surveys. One is concerned with how different groups (e.g. hospital administrators, ambulance operators, citizens) view the role of the emergency medical services. The other survey explores the problems of patient and bystander response to medical emergencies. In particular, the problems of delay or non-use of emergency ambulance services in many truly emergency cases is identified as an area of as much concern as that of improving the efficiency of the ambulance service.

The development and use of analytical models for locating and dispatching emergency ambulances, similar to those reported in this journal, are described.[1] The evaluation of the use of a mobile coronary care unit is also discussed. Also, a simple procedure for allocating ambulances in more rural (low demand) areas, using a procedure to determine a "coverage" matrix from a matrix of travel times is illustrated.

Other contributions are on the screening of emergency ambulance calls (more relevant in the States where only an emergency service is provided), and a description of an interactive graphical simulation model of an emergency room.

The final paper models the impact of treatment strategies on death from myocardial infarction. A first model estimates the impact of different ambulance service strategies on the probability of pre-hospital death. This is then incorporated into an overall model of the life course of an individual following a first infarction. Some findings are that patient and bystander delays in assessing the ambulance service seriously limit the effectiveness of the treatment and that even large reductions in pre-hospital cardiac mortality will not lead to dramatic increases in the life expectancy of victims of myocardial infarction.

Overall, this collection of papers provides a useful illustration of the application of quantitative methods in planning emergency medical services. It is aimed at an operational research readership but at a general illustrative, rather than a technical, level. However, some of the original reports on which the book was based are available from the Institute. A large number of references are given in the notes at the end of each paper, although many of these are to American clinical publications.

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REFERENCE
[1] K. N. GROOM (1977) Planning emergency ambulance services. *Opl Res. Q.* **28,** 641–651.