TESTING AN EMERGENCY AND REGIONAL MEDICAL HELICOPTER TRANSPORT SYSTEM

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ABRIDGMENT

•THE OBJECTIVE of this study was to plan the organization of a helicopter delivery system to serve both emergency and regional medical needs in a specified section of West Virginia. Simulation techniques were used to examine alternative helicopter delivery systems for various levels of emergency evacuations, routine interhospital patient transfers, and preventive medical care demands. The geographic area selected for concentration was the region in which the West Virginia University Medical Center serves as the focal point for emergency and specialized medical services.

A coordinated pair of simulation models was constructed to describe the operational performance of a helicopter system assuming that 2 helicopters were based at the West Virginia University Medical Center. The helicopter system would perform a combination of the following functions:

1. The proposed system could keep helicopter units available for the prompt delivery of medical aid and the subsequent evacuation of emergency cases in critical need of extensive treatment;
2. The same network could efficiently transport medical teams to mobile clinic sites located in remote communities with periodic needs for preventive medical care; and
3. The helicopter system could also accelerate the flow of patients among hospitals.

The information inputs for the emergency evacuation model were based on analysis of patient arrivals at the emergency room of the West Virginia University Medical Center during a 2-week period. Patients who could be diverted to a helicopter system were identified by the patient's general diagnosis, the acceptance of a patient to particular advanced treatment stations, and the time before examination by a physician of a patient after arrival in the emergency room. Data for the preventive care model involved estimating the amount of preventive medical care needed by isolated communities. Under current conditions, persons living in 33 identified isolated localities must travel from 10 to 26 miles to reach the nearest physician. It was assumed that, by dispatching mobile trailer units in combination with medical teams commuting by helicopter, the availability of medical resources for rural residents could be efficiently increased. Criteria for scheduling the distribution of medical team units for such a hypothetical medical program were based on a recommended standard that 1 physician should be made available per 1,200 persons.

The basic hypothesis of this study was that regional medical services could be included in an emergency medical transport system by dispatching mobile trailer units in combination with medical teams commuting by helicopter. Through such an arrangement, the availability of medical resources for rural residents could be increased. The residents isolated from a nearby physician could then benefit from early diagnosis of conditions leading to such illnesses as cancer, strokes, or heart attacks.

The results indicate that it is possible to deploy a helicopter transport system to handle emergency medical functions along with routine transfers and regional medical ser-

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vices. With this 3-pronged approach toward improving the delivery of medical services for a test region in West Virginia, only a few minor conflicts would have resulted. During the 15-day simulation period, 2 routine transfer requests would have incurred delays of 15 min each. None of these delays was serious enough to detract from the effectiveness of the helicopter system. Also, with the introduction of a 20 percent static level (1 false call after every 4 emergency calls), only 1 medical team transfer mission would have been delayed by 10 min; otherwise, static imposed no interference with the delivery of emergency transfers, routine transfers, and regional medical services. This study further showed that 2 medium-sized helicopters could save 9 hours over the existing ground ambulance system during the peak 72 hours of emergency calls. On an annual basis, the cost to operate 2 medium-sized helicopters would be $250,000.

In addition, a helicopter utilization factor of 12 percent for emergency and routine transfer functions was expanded to 19 percent with the introduction of regional medical services during an 8-day period. For the peak 3 days, the utilization rate for a medium-sized helicopter was 27 percent with all 3 functions. However, expanding the helicopter system to transfer medical teams would only increase the annual cost over the basic emergency function by $57,100 for 1 medical team (40 hours of service per week) and $114,200 for 2 medical teams (80 hours of service per week). This respectively represents a 23.1 and 46.2 percent annual increase in cost over the basic emergency service for a medium-sized helicopter.

Use of helicopter medical system for the 3 functions outlined has the advantage of providing a complementary system that achieves a high helicopter utilization factor. Also, the system can be administered by 1 organization while upholding the respect of a "medical ship." Thus, multiple uses of the helicopter for related medical purposes appear to be attractive in serving a rural area with a dispersed population and do not detract from the dispatching of the helicopter on emergency medical missions.