

ASPECT REGARDING THE CHOICE OF AN AIR OR GROUND AMBULANCE FOR THE PROVISION OF EMERGENCY MEDICAL CARE ON THE TERRITORY OF THE REPUBLIC OF BULGARIA

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Abstract: *An algorithm and a program instrument for making a decision on the use of a helicopter or a specialized car for emergency medical care in the Republic of Bulgaria is proposed. A Matlab program implementation is developed. As a result, helicopter or ambulance from the nearest centre is activated.*

Keywords: *helicopter, ambulance, emergency medical care, air rescue center, algorithm*

1. INTRODUCTION

The report proposes one possible algorithm for decision making on the use of a helicopter or a specialized car for emergency medical care in the Republic of Bulgaria. The basic criterion of the presented algorithm is the time of one hour “golden hour” to help an injured person.

2. DECISION-MAKING ALGORITHM FOR THE USE OF EMERGENCY MEDICAL ASSISTANCE BY AIR OR A SPECIALIZED CAR IN THE REPUBLIC OF BULGARIA

The report presents the main centers for emergency medical care in Bulgaria. Their exact coordinates are determined in Google Earth in degrees [1]. There are hospitals capable of providing the necessary help to a injured person close to these centers for emergency medical care.

There is also a minimum number of air rescue centers on Bulgaria's territory, where helicopters for emergency medical care are located. Their coordinates are determined also [1]. In practice, such centers do not exist in Bulgaria in this way. The following factors have been taken into account to determine their location:

- ✓ the most complete coverage on the territory of the country, places difficult to reach for road vehicles (areas with hilly-mountain and mountainous relief), main roads and railways, sea and river areas;
- ✓ possible disaster threats analyzed for the territory of Bulgaria;
- ✓ availability of centers for emergency medical care and hospitals, disposable helicopters and airport infrastructure;
- ✓ dislocation of formations by the Bulgarian Army to help the population in disasters Fig. 1.

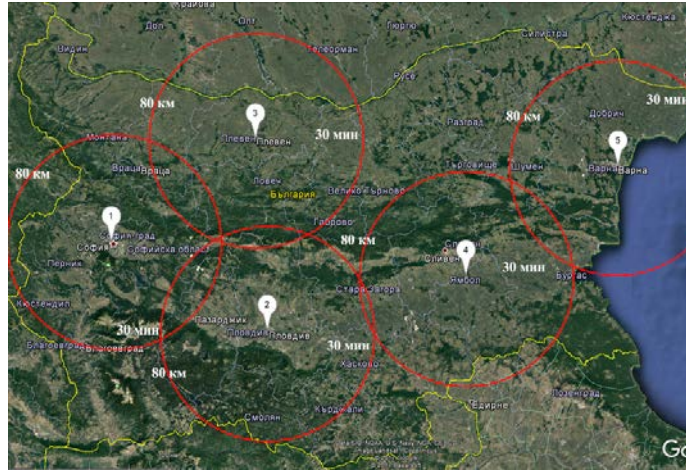


FIG. 1. Location of possible air rescue centers on the territory of the Republic of Bulgaria

The purpose of the algorithm is to allow the selection of an emergency medical center or an air rescue center from which an ambulance or helicopter can be dispatched. The selection criterion is the time for transporting an injured person to a hospital from reporting a case, which should not exceed one hour.

The possible areas of helicopter and ambulance action from the respective centers are determined, depending on their average speeds and the reaction time of the centers. The response time of the centers is 10 minutes. The speed of an ambulance is estimated at 70 km/h, for a helicopter - 230 km/h. The algorithm drawn is the type shown in Fig. 2.

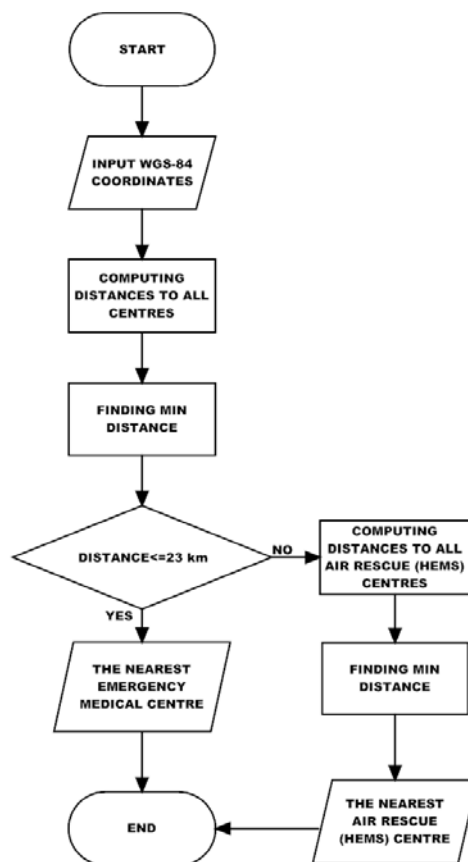


FIG. 2. Algorithm for selecting an ambulance or helicopter from the nearest center to help an injured person

3. PROGRAM IMPLEMENTATION

This algorithm is used to compile a program that allows you to select and activate a specific emergency medical center or air rescue center from the territory of Bulgaria. If there is a possibility an injured person to be transported to a hospital within 1 hour from reporting a case by ground ambulance, it is not necessary to use a helicopter. When entering the coordinates of an injured person, the program provides the option of choosing a particular center to be activated.

Fig. 3 and Fig. 4 represents results after program calculation.

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Command Window
>> emergency_medical_care
Input WGS-84 coordinates of injured person
Longitude (degrees): 24.53
Latitude (degrees): 43.24
The nearest emergency medical care centre is in
Lovech
on distance 18.5971 km
Use ambulance from emergency medical care centre. The distance is less than 23 km.
    
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Fig. 3. Decision to use an ambulance to provide emergency medical care

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>> emergency_medical_care
Input WGS-84 coordinates of injured person
Longitude (degrees): 23.51
Latitude (degrees): 42.23
The nearest emergency medical care centre is in
Blagoevgrad
on distance 41.4855 km
The nearest air rescue (HEMS) centre is in
Sofia
on distance 54.536 km
Use helicopter from air rescue centre.
    
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Fig. 4. Decision to use a helicopter for emergency medical care

CONCLUSIONS

The program implemented on the presented algorithm is to be improved by introducing a detailed digital map of Bulgaria. This will increase the accuracy of choosing a particular center and better illustrate the specific situation of the emergency.

REFERENCES

- [1] *** Google Inc. *Google Earth*