Title: The emergency doctor employment helicopter project. Design in rescue medicine in Germany.

Schedler, O.
Arbeitsgemeinschaft in Brandenburg tätiger Notärzte (AGBRN)

Abstract: The emergency doctor employment helicopter (NEH) project was began in September 1995 in order of district administration Bad Doberan (DBR) to rescue medical care. The helicopter staff manages 1134 actions annually in average. In the case of 96 percent of all operations flown in a time limit of rescue of 10 minutes is managed. 97,4 percent of emergency operations are flown without any difficulties. The medical equipment is equivalent with emergency ambulance (NEF). The patients transportation in NEH is not practicable. The patients profile represents life rescue with a plain share of accidents and injuries. With the help of stated results the high efficiency and effectivity of the fast medical help of life rescue with the doctor employment helicopter could be proved for this geographical area.

Introduction: The emergency doctor employment helicopter (NEH) project was began in September 1995 in order of district administration Bad Doberan (DBR) to rescue medical care. Through the large geographical situation with few inhabitants around hanseatic league city Rostock started the NEH to reduced of the rescue time limit in cooperation with private ambulance service Millich. The area of district amount to 1362 km² with 118064 inhabitants. The fares away of emergency operations is half island Wustrow and Baltic sea town Rerik in nord west, Baltic seat town Graal Müritz in nord east and city Schwaan in south. The length of seaside is 62 kilometres. The longest road distance from rescue base is approximate 50 kilometres.

Picture 1: Helicopter operation area in district administration Bad Doberan

Now the emergency doctor, rescue assistant is taking from the pilot with the helicopter Robinson 44 (R 44) in order to heliflight Reichelsheim to the emergency place. In this place follow the primary supply through the staff with medical equipment and drugs. The medical equipment is equivalent with emergency ambulance (NEF). In difference to the logistics of air rescue in germany the patients transportations take place in a ambulance or by rescue transportation helicopter (RTH). The patients transportation in NEH is not practicable.

Picture 2: Robinson R 44 in emergency medicine

The helicopter from Robinson – California USA according to suitability air classification 3 in JAR-OPS 3 in germany. The outside dimensions are 11,8 metre in length, 3,3 metre in high and rotor diameters of 10 metres. With an air cooled carburettor motor develop this helicopter a power of 200 kW a speed of 120 knots and a maximal take off weight of 1090 kilograms, include 4 person crew. The total baggage racks are present accommodations of medical equipment.

The medical helicopter equipment are contain

1. defibrillator lifepak 10
2. medical rescue bag (german regulations DIN 13232)
3. paediatric rescue bag (german regulations DIN 13233) with coniotomy sets, intraosseous needle
4. surgery first aid kit with thoracic drainage
5. antidote drug set
6. bag with triage material, recovery
7. suction pump
8. oxygen bottle with pressure limit valve
9. oxygen masks normal and with reservoir
10. siffneck (large, medium, small)
11. breathing system

Picture 3: Medical equipment in R 44

The emergency doctor employment helicopter of the Millich ambulance is coordinated by Bad Doberan rescue central office. It is on air from sunrise to sunset (± 30 minutes). After sunset the medical staff are brought in the same area of action with an emergency ambulance (NEF).
Through the territorial special areas features at the seaside (such as beach, dune, island, water) the time limit of rescue could not be guaranteed with the use of emergency ambulance (NEF) until now. Furthermore the NEH could be employed for search and supply of drowning emergencies at the seaside in the case of weather conditioned squad for take off and with support of the german life and rescue society (DLRG). On account of the consensus team that deals with development of air rescue in germany, the project of emergency doctor employment helicopters as part of development, has been rejected for aeronautical engineered and medical reasons.
The present retrospective essay summarizes the work and achievement of the helicopters crew from NEH with reference to a period of more than 7 years.

Material and methods: The documentation of rescue actions has been placed on record on recommendation of german interdisciplinary society of intensive care und rescue medicine (DIVI). Medical, flight dependent and action strategically facts have been recorded for evaluation too. A spreadsheet software program has been used for data survey of action. The evaluation refers to a period from September 1995 to June 2002.

Results: The emergency doctor employment helicopter (NEH) was on air for 7727 actions during the period of evaluation. The mean emergency operation per year was 1134. From 6:00 a.m. to 4:00 p.m. 78 percent of all actins are flown. 22 percent of all actions are made during the time period from 4:00 p.m. to 10:00 p.m. 30 minutes past sunset the helicopter is not available for emergency supply. In table 1 the number of actions is described referring to year and month.

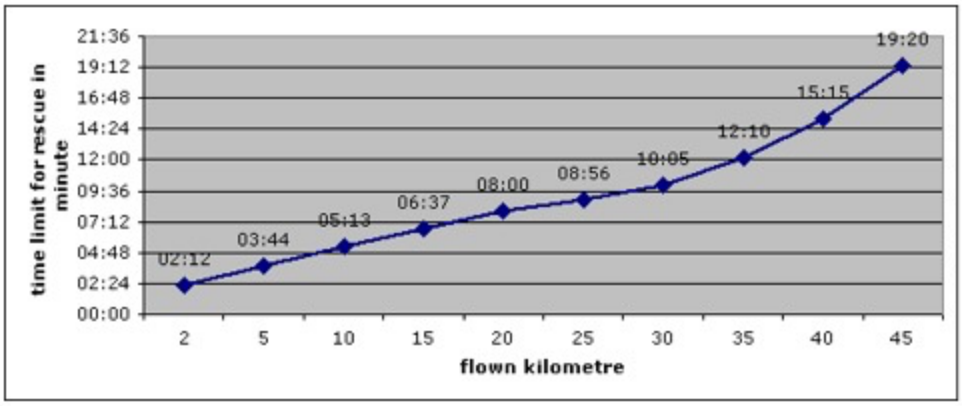
Table 1: Rescue operations of NEH referring to month and years

Month	1995	1996	1997	1998	1999	2000	2001	2002
January		33	50	45	48	59	82	95
February		48	61	69	57	54	77	112
March		35	80	64	67	95	103	120
April		45	81	85	100	113	121	142
May		80	112	95	97	145	139	148
June		97	119	101	110	121	144	159
July		107	118	135	156	157	181	

August		94	125	146	118	170	188	
September	25	89	104	98	91	119	123	
October	46	81	78	88	76	100	130	
November	28	56	61	45	59	100	113	
December	43	56	55	54	52	105	124	
Sum	142	835	1044	1036	1031	1338	1525	776

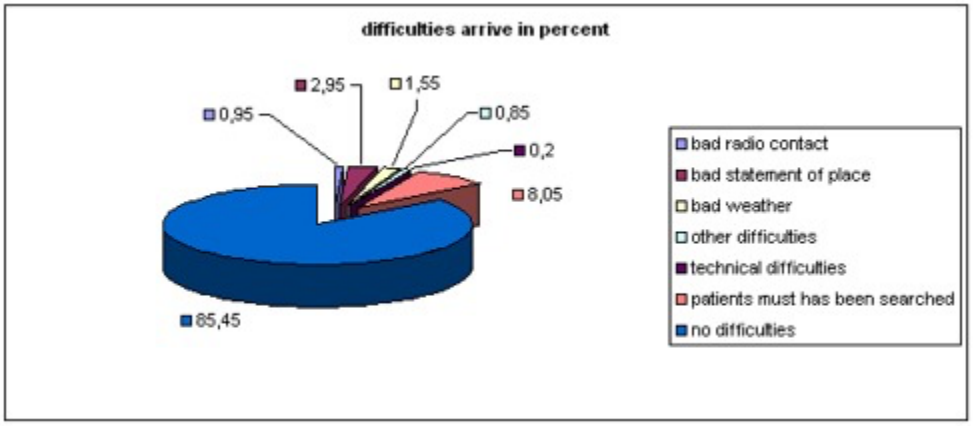
To guarantee an objective account the average arriving period they have been demonstrated corresponding to flown kilometres. For this period the time between call and arrive have been assessed. Difficulties in arrive, place of landing and furthermore the distance between place of landing and patient are comprised as well. Graphic 1 shows the arriving periods with reference to the flown kilometres.

Graph 1: Time limits to help



At the most speed the helicopter needs 54 seconds for a negligible distance of 2 kilometres. A time difference of 1:18 minutes is required for take off and landing. However this time for action represents only 1,1 percent of the total number of all actions flown. A delay of action to the place of emergency could be caused by the following difficulties in arrive. However 85 percent in average at all operations went according to plan.

Graph 2: Difficulties emergency arrive



In average the place of emergency has been readied in 6 minutes and 30 seconds. During that period of time 15 kilometres have been covered (76 percent). In table 2 the distances to the place of emergency and their percentage are shown. The reading refer to the percentage of calculated mean values from the 7727 actions, that have been flown.

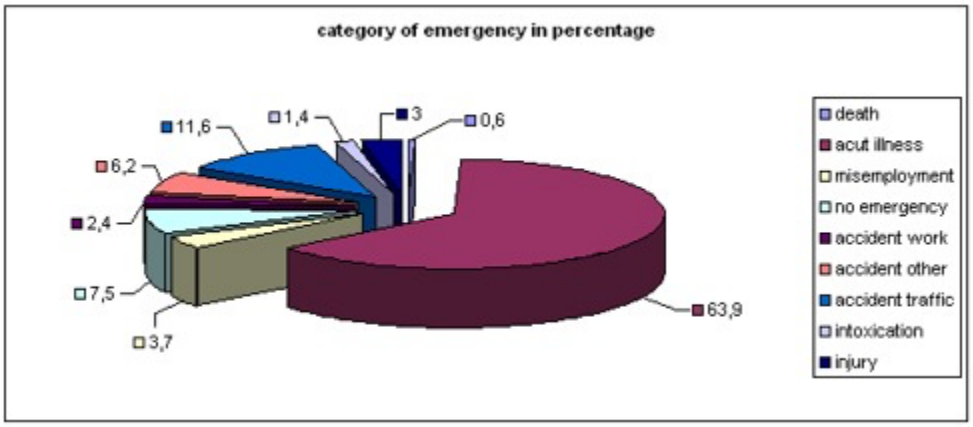
Table 2: Distance to emergency action

Flown kilometres	Percentage

2	1,1
5	4,7
10	11,5
15	75,9
20	12,4
25	8,6
30	3,5
35	1,6
40	3,3
45	0,4

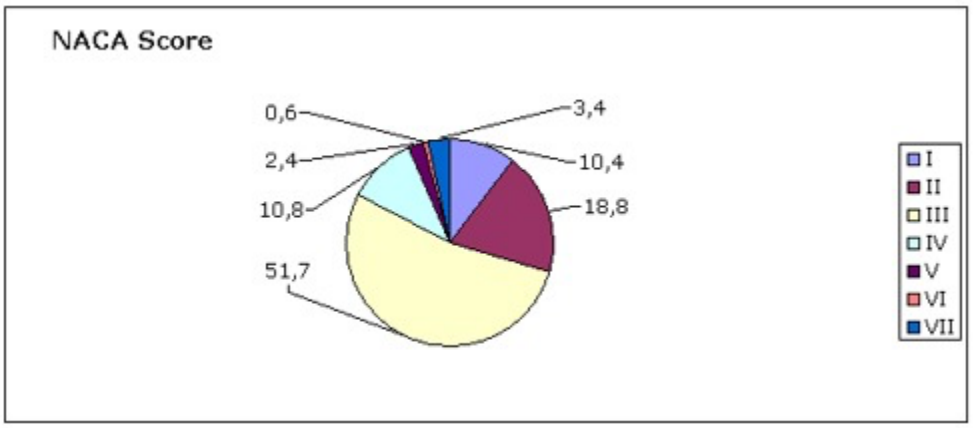
On emergency place the medical staff attended to patients with following disease classifications. 52,6 percent of all patient were acute internal disease. In 27,4 percent was provide surgical disease and 15 percent other emergencies. The percentage of misemployment was 5 percent. The different classification on case of emergency has been shown in next graph. Here shown the percentage in mean value of operations.

Graph 3: Case of emergency



The degree of seriousness of illness category has been grouped with regard to national advisory committee for aeronautics classification (NACA). The symptoms in class I represent insignificant disorder of well being. This group of patients has been examined and treated with a frequency of 10,8 percent. An ambulant balance of exist symptoms has been necessary in the case of 18,1 percent of patients because they have been graded to class II. 51,7 percent of all patients have been grouped to class III. These patients must have been assigned to in patient treatment. 10,8 percent of the patient with emergencies acute illness grouped in class IV in danger of life and 2,4 % of all emergency patients are in danger of life class V. In approximately 1 % of all patients has been resuscitation necessary and grouped in class VI. In a case of 3,4 percent death occurred or could have been diagnosed of arriving. This part of patients corresponds to class VII. The display of the data used in graphic drawing corresponds to proportional frequency.

Graph 4: NACA Score



56,7 percent of persons and patients have been men at the average age of 41,4 years. In contrast 43,3 percent of woman at the average age of 44,2 years have been treated.

Discussion: The emergency doctor employment helicopter manages 1134 actions annually in average. In the case of 96 percent of all operations flown in a time limit of rescue of 10 minutes is managed. 85 percent of emergency operations are flown without any difficulties. That is why the emergency doctor employment helicopter has contributed substantial to the fact that a lawful defined time limit for rescue of 10 minutes is kept to administrative district concerning in the case of 85 percent. On the basis of the far reaching area its geographical position and the minor infrastructure of its medical treatment institutions in Bad Doberan district 78 percent of all patients (n= 6027) are managed during period between 6:00 a.m. and 4:00 p.m. (MEZ). Only in the case of 1,6 % or rather in 1 % bad weather fronts or technical difficulties are responsible the reason for a delayed or rather an impossible attainment of patients. That is why the doctor employment helicopter is a fast and safe expedient for delivery of medical staff for rescue to the place of emergency. For this reason the option of the weather minor justified employ could be excluded as an argument. Situations of rescue at the seaside in which the NEH offers an indisputable temporary and logistic advantage are excluded. The team of NEH manages 75 percent of internistic and surgical emergencies within supply profile (n=5795). 64 percent of acute illnesses (n=4945) and 23 percent of emergencies caused by accidents and injuries (n=1777) come under that management. The NEH is used for accidents in traffic with a frequency of 11,6 percent (n=896). Death has been diagnosed or must have been diagnosed in the course only 0,6 % of all actions. Therefore quality and quantity of medical treatment could not be criticized or designated as “Flying doc bag”. With regard to qualification of medical staff valid guidelines are observed, although the assistant for rescue must not be HEMS Crew member inevitable. Because of the fact that the NEH is not planed are transportations of patients, 83,7 percent of patients are transported with help of ambulance (RTW, NAW) or rescue transportation helicopter (RTH) after primary treatment. Therefore the argument of the non available opportunities for the transportation of patients within the NEH project remains valid. This claim is not imposed primary. An economical integration of the NEH within NEF and RTH, that could be remunerated as limp sum for action is rather important. The realization of that project by private rescue company shows the financial opportunities of the fast and sufficient medical treatment in full circumference. The difference concerning the costs is justified by pilot and aviation device in contrast to NEF and it is visibly under the cost limit of RTH. Furthermore it must bearer in mind that payment and management of emergency transportation helicopters are duties of the country in germany and not of rescue companies.

Conclusions: The doctor employment helicopter has essential contributed to the fact, that the 10 minutes time limit for rescue is kept in 85 percent of all emergency action in Bad Doberan district. After alarming a rescue team consisting of doctor of call, rescue assistant and pilot is available within the period of 6:30 minutes at all places of emergencies that are located in the area of treatment. The staff is equipped with medical laboratory appliances with regards to DIN EN. 97,4 percent of all

patients took its normal course because there have not been any difficulties. The patients profile represents life rescue with a plain share of accidents and injuries. A very well medical treatment of patients could be documented. Therefore the opportunities of fast availability of medical help still remain at the project of NEH in contrast to NEF project. An other particular advantage of NEH is to be seen in its action at seaside. After medical treatment 84 percent of patients have been transported to hospital with the help of other rescue expedients. With the help of stated results the high efficiency and effectivity of the fast medical help of life rescue with the doctor employment helicopter could be proved for this geographical area.

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