TITLE: FACTORS INFLUENCING ACTIVATION AND APPROACH TIMES OF HEMS IN SOME ALPINE COUNTRIES

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Until now there had not been any research project
that would:

1. compare HEMS of different countries in respect to their quality indicators
2. explore the influence of different factors on HEMS quality.

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We all know: TIME IS LIFE!
So as short as possible activation and approach times
are among most important quality indicators
of HEMS / mountain rescue! Regardless of the type of the accident (road, mountaineering, climbing, paragliding, serious ilness etc.)

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As you all know, last year ICAR MEDCOM finished and presented our new **Medical Standards for Mountain Rescue Operations using Helicopters: Official Consensus Recommendations of the International Commission for Mountain Emergency Medicine (ICAR MEDCOM)**
Intended for use when helicopters are activated for the rescue and treatment of casualties in the mountainous areas: for local authorities, rescue organizations and helicopter operators.

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In these standards there is also time section:
TIME
With optimal organization and modern helicopters it is possible
to have an activation time (time from emergency call to HEMS take off) of **< 5 minutes.**
From a medical perspective an approach time (from emergency call to HEMS team reaching the victim) of **< 20 minutes** is favorable

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The aims, goals of our research were also:

1. **To analyze HEMS organization/ operation of some Alpine countries**
2. **To find out activation and approach times during their missions,**
3. **To find out which factors have an influence on activation and approach times,**
4. **To design a model of organization (activation) of HEMS, which will predict shortest activation and approach times.**

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It was a multicentre retrospective study on sample of 6121 case reports (rescue missions)

from 9 HEMS bases from four countries: Austria, Slovenia, Spain, Switzerland

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The description of our sample:
All sequential rescue missions in time period, secondary and night missions were excluded

HEMS BASE	*Country*	No. of missions	% of all missions
HEMS SLO	Slovenia	274	4,4 %
RARON	Switzerland	1019	16,4 %
SION	Switzerland	1932	31,0 %
ZERMATT	Switzerland	1162	18,7 %
FLYCOM	Slovenia	13	0,2 %
PILOT SLO	Slovenia	454	7,3 %
KITZBÜHEL	Austria	1070	17,2 %
ARAGON	Spain	105	1,7 %
GRZS SV	Slovenia	92	1,5 %
ALL		**6121**	**100 %**

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STATISTICAL METHODS
66 VARIABLES: mission times, composition of HEMS team,   dispatch system, features of activation, ruling organizations, diagnoses, medical treatment, financing, location, experience, equipment etc.
- T test
- Chi square
- Kruskal Wallis
- Man Whitney
- Jonckheere-Terpstra
- Spearman
- Ward formula
- Classification regression tree
- BPR (Business Proces Modelling)
- EEPC (Extended Event-Driven Process Chain)
- ARIS (Architecture of Integrated Information Systems

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We found great differences in an average activation and approach times among included HEMS bases.
AVERAGE ACTIVATION AND APPROACH TIMES (picture)

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With CLASSIFICATION REGRESSION METHOD (CRM) we detected FACTORS WITH STRONGEST INFLUENCE ON ACTIVATION TIME (picture)

Normalized Importance
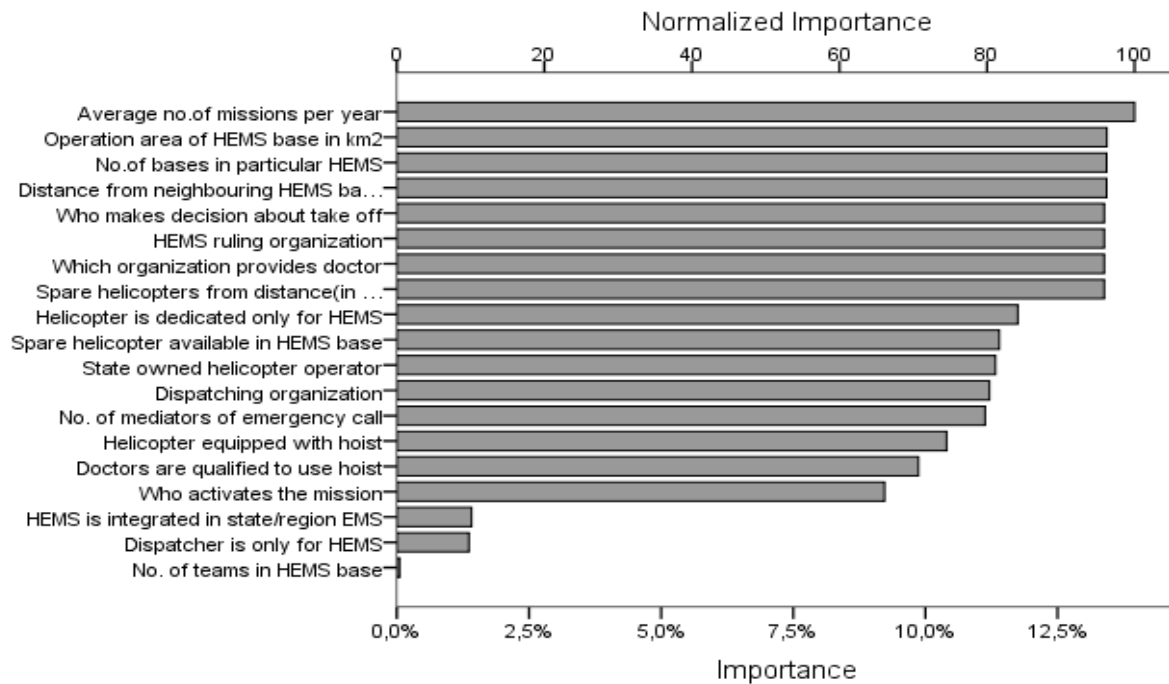
Growing Method: CRT

Dependent Variable: The activation times of HEMS units

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With CLASSIFICATION REGRESSION METHOD ON BASIS OF ACTIVATION TIME we researched activation time improvements with selection of influential factor cathegories which have as many traces as possible in other categories of factors.

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We lso did HEMS ACTIVATION PROCESS MODELING with EEPC MODEL,
BPR METODOLOGY and ARIS TOOL). Here is the optimal model of HEMS activation, which provides shortest activation time

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And finally, we calculated which factors have a positive influence on shortening activation and approach* times of hems bases:
 *nonparametric correlation coeff. between activation and approach time is 0,77
  1. Helicopter operator is a private company, not state owned (police, army),
  2. Helicopter is dedicated and equipped only for HEMS (including mountain rescue),
  3. HEMS base is integrated in EMS of particular country,
  4. Dispatching is performed by specialized, integrated regional dispatching centres,
  5. HEMS can be activated directly only by dispatching centre,
  6. There is only 1 mediator between emerg. call and HEMS base,
  7. All HEMS team members are on the same location in HEMS base close to the helicopter,

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  8. The distance from neighbouring HEMS base is around 90 km,
  9. HEMS has more HEMS bases,
  10. Operation area is up to 10.000 km2,
  11. Higher number of missions per year (at least 600),

12. Doctors are employed by private organizations,
13. Helicopters are equipped with hoist or fixed line (short haul),
14. Doctors are trained to use hoist or fixed line (short haul),
15. Modern helicopters with short ignition (pre take off) phase,
16. More than 20 years of experience,
17. Financing mostly on commercial basis (insurance…) , not from state budget (the influence of market, competition...)

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Most of these factors can be influenced by organizational and other measures!