

Identification of cost indicators with significant economic impact on the total treatment costs of chronic heart failure patients – A meta-analysis

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Chronic Heart Failure in Austria

- **Estimated 300.000 people suffering chronic heart failure in Austria**
- **25.000 out of 27.000 HF patients hospitalized in 2015 were 65. years old or more**
- **Average duration of hospital stay for HF patients amounts to 8.4 days**
- **Average annual costs of HF treatment around 320 million Euros**
- **Healthcare provider: Where to start to optimize the costs of treatment?**

Current challenges

- **Missing cost distribution models for the treatment of HF (usual care vs. telemedicine)**
- **Limited data availability to compare costs based on different treatment methods (usual care vs. telemedicine)**
- **High time and cost investments to evaluate the treatment costs within the scope of clinical studies**
- **Available research studies focus primarily on the medical effectiveness of HF treatment methods**

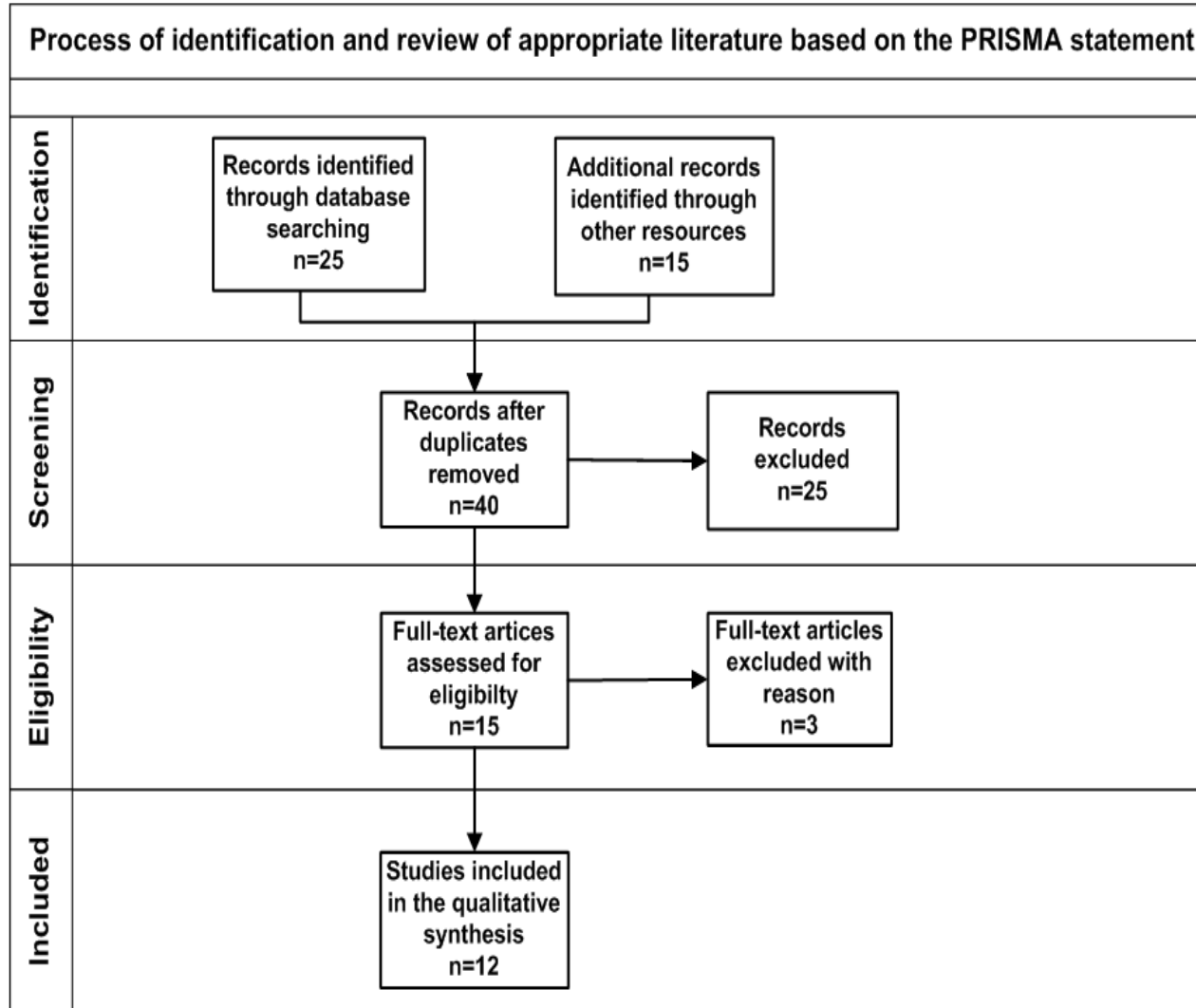
Objectives

- **Identify key cost indicators of HF treatment (usual care vs. telemedicine) based on a meta-analysis**
- **Describe, analyze and quantify the delivered services for identified cost indicators**
- **Compare costs of HF treatment based on the key indicators usual care vs. telemedicine**
- **Determine the type of correlation between intervention and hospitalization costs**

Approach

- **Selection of adequate research papers by performing a:**
 - **Quantitative synthesis based on the recommendations of the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” (PRISMA-Statement)**
 - **Qualitative analysis by the definition of an additional set of criteria based on the “method of reduced list costing“**

Quantitative synthesis - PRISMA Statement



Qualitative synthesis - Reduced List Costing

- Which cost indicators are directly involved in the treatment process
- What are the specific healthcare services provided by each indicator
- The top five cost indicators form ($\geq 95\%$) of the total costs of treatment
- The weighting is based on the absolute and cumulative distribution frequency
- Plausibility check based on cost data derived from the research articles

Results

1. Costs of hospitalization, include

- Costs of hospitalization
- Nursing staff
- Blood products
- Medical equipment and medical examinations
- Anesthesia
- Diagnostic tests and the costs of the hospital ward

2. Costs of medical services, include

- Costs of diagnosis
- General practitioners, medical specialists, druggists
- Home calls, ambulatory care services, therapists, primary care, ambulatory treatment and the costs of medical care

Results

3. Costs of medication, include

- Costs of drugs prescribed to patients during the treatment

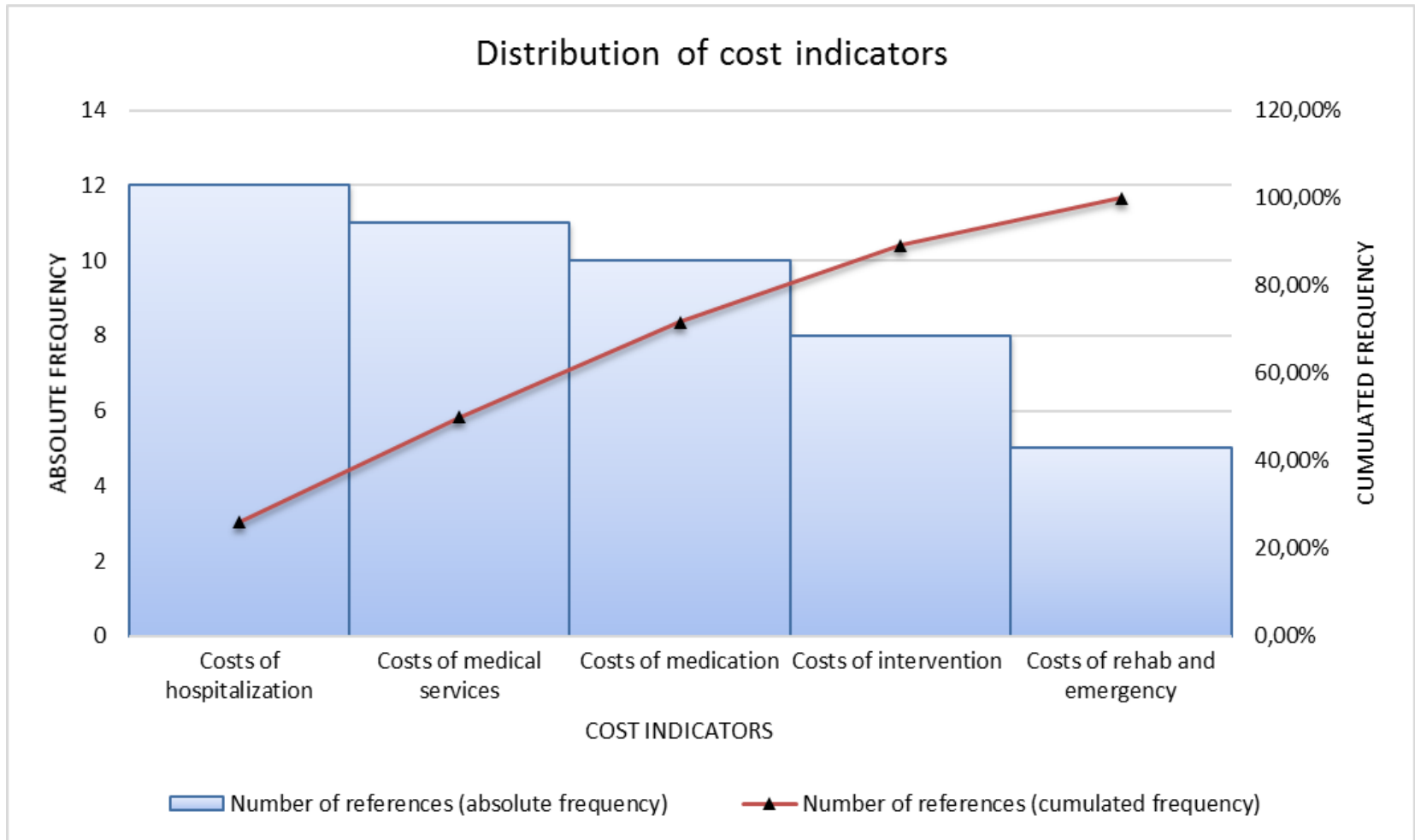
4. Costs of intervention, include

- Costs of TM equipment, TM services, TM monitoring
- TM trained nurses, TM support and consulting, TM training, TM based medical supervision

5. Costs of rehabilitation and emergency services, include

- Costs of the emergency ward and rehabilitation

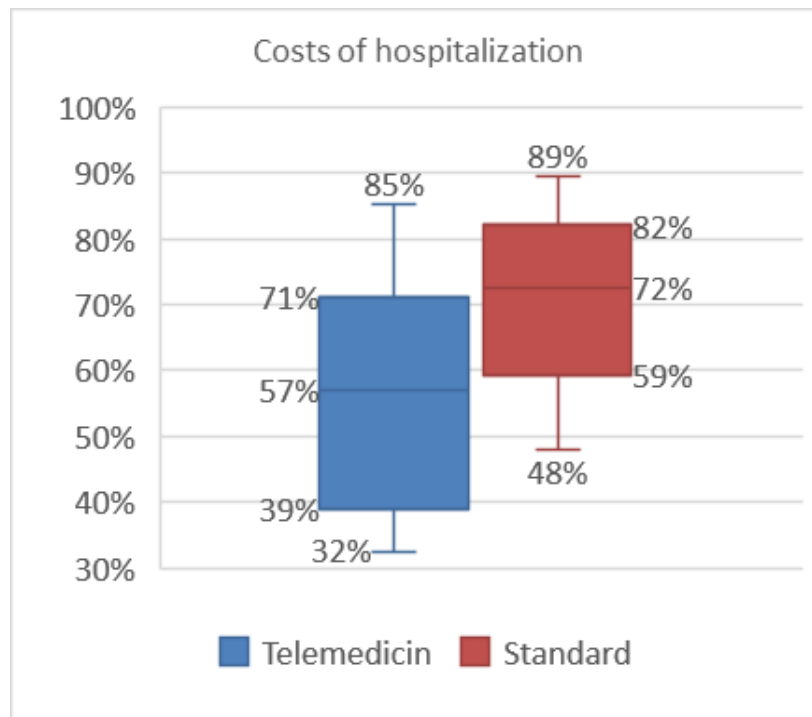
Distribution frequency of cost indicators



Data analysis

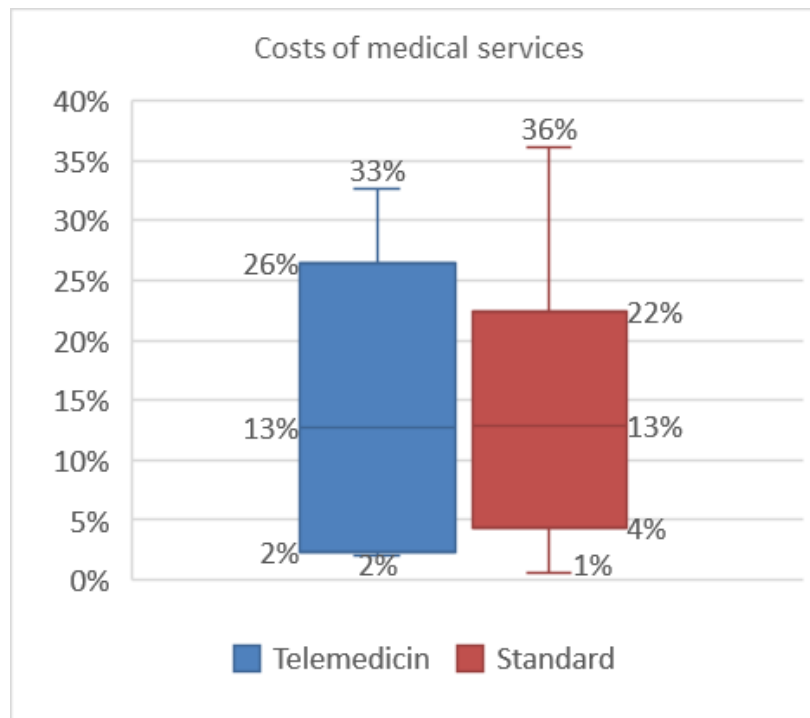
- **Classification of treatment costs based on identified cost indicators**
- **Comparison of treatment costs based on cost indicators for usual care vs. telemedicine**
- **Investigation of the statistical significance and correlation coefficient btw. the treatment methods**

Data analysis – costs of hospitalization



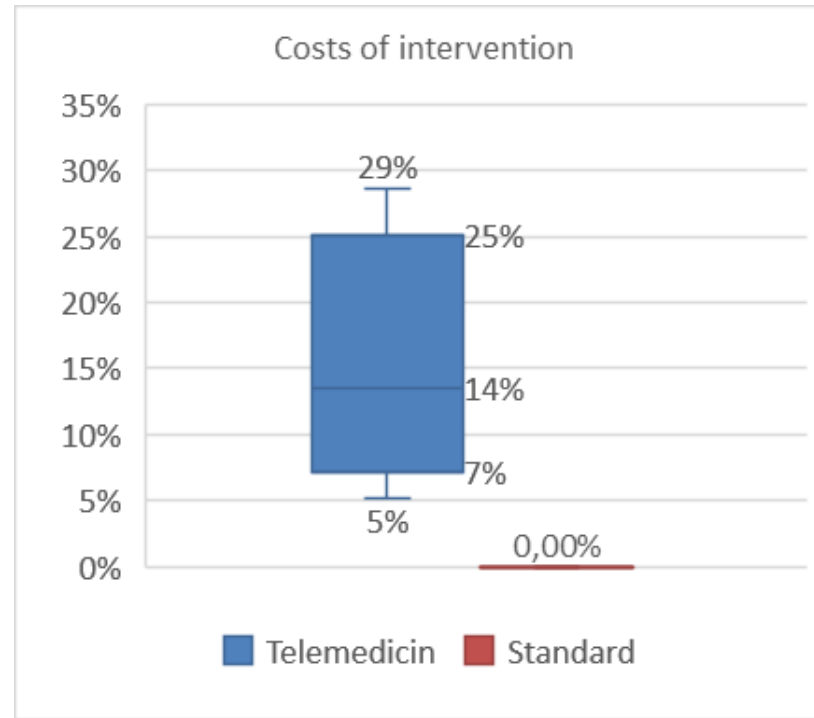
Statistical value	Costs of Hospitalization in %	
	Standard	Telemedicine
Median (x_{med})	72.48	57.11
Mean (\bar{x})	70.84	56.54
IQR	22.67	32.22
ρ	0.0373	
r	0.8379	

Data analysis – costs of medical services



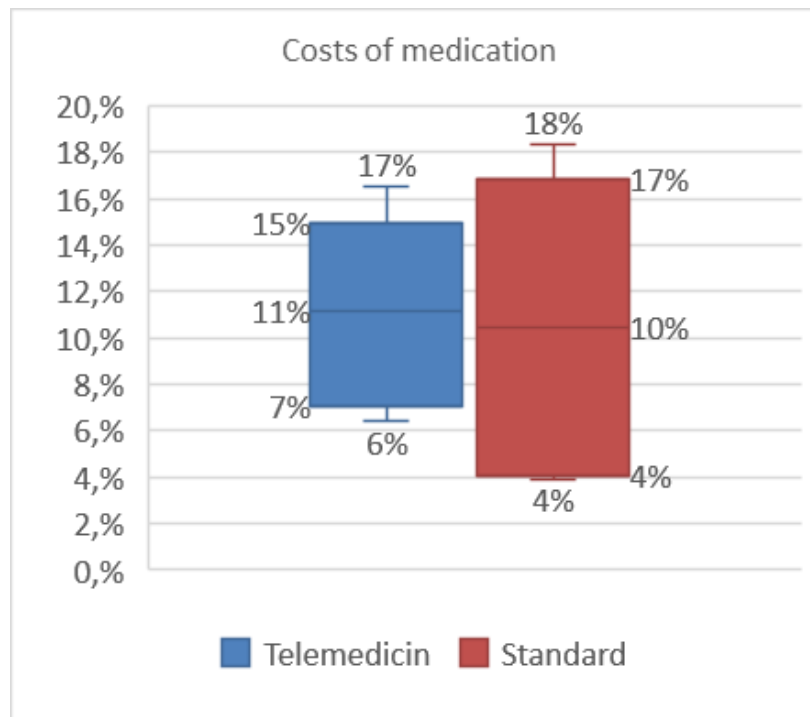
Statistical value	Costs of medical services in %	
	Standard	Telemedicine
Median (x_{med})	12.89	12.71
Mean (\bar{x})	14.33	14.46
IQR	18.04	24.13
ρ	0.0961	
r	0.7349	

Data analysis – costs of intervention



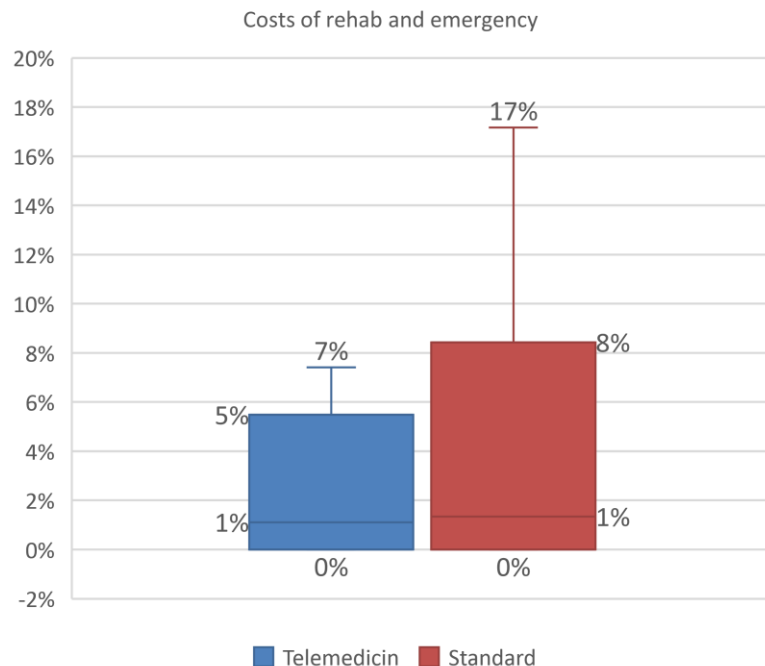
Statistical value	Costs of intervention in %	
	Standard	Telemedicine
Median (x_{med})	0	13.54
Mean (\bar{x})	0	15.43
IQR	0	17.92
ρ	0	
r	0	

Data analysis – costs of medication



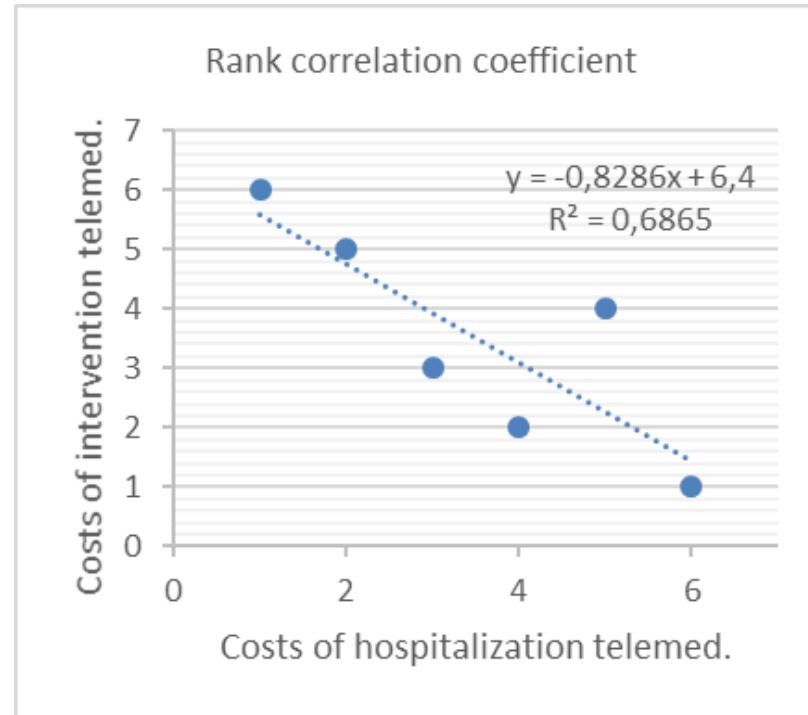
Statistical value	Costs of medication in %	
	Standard	Telemedicine
Median (x_{med})	10.47	11.14
Mean (\bar{x})	10.60	11.15
IQR	12.76	7.94
ρ	0.0006	
r	0.9806	

Data analysis – costs of rehab and emergency



Statistical value	Costs of rehab and emergency in %	
	Standard	Telemedicine
Median (x_{med})	1.34	1.11
Mean (\bar{x})	4.23	2.41
IQR	8.43	5.48
ρ	0.0043	
r	0.9459	

Rank correlation btw. Intervention & hospitalization costs



Discussion

- **Cost structure and cost allocation were highly dependent on the characteristics, aims and employed therapy methods of the various research studies**
- **Identified top 5 cost indicators covered a wide spectrum of ($\geq 95\%$) incurred therapy costs per therapy**
- **Order of cost indicators, based on the determined median values, showed only a marginal difference in comparison to the order of costs based on the frequency distribution (intervention costs vs. costs of medical services)**

Outlook

- **Analyze the sensitivity of identified cost indicators**
- **Development of an adequate Markov model to test and predict the trend of treatment cost based on the top 5 indicators**

