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Ehemaliger Vorstand: Prof. Dr. med. Gerold Stucki

Kommissarischer Vorstand: Prof. Dr. med. Dennis Nowak

„Assessment and determinants of health care utilization among patients with musculoskeletal conditions undergoing outpatient rehabilitation in Germany“

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Carla Sabariego Tomás

aus

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Berichterstatter:	Prof. Dr. Gerold Stucki
Mitberichterstatter:	Prof. Dr. Peter Kröling
	Priv. Doz. Dr. Christoph Lücking
Mitbetreuung durch den promovierten Mitarbeiter:	----------
Dekan:	Prof. Dr. med. Dr. h.c. M. Reiser, FACR, FRCR
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1. Background

1.1. The burden of musculoskeletal disorders

Musculoskeletal disorders affect hundreds of millions of people around the world and are related to important limitations in functioning as defined in the "International Classification of Functioning, Disability and Health" (ICF) [1, 2]. In the ICF functioning is no longer seen as the consequence of a disease but in relation to a health condition, as well as to personal and environmental factors. Due to the significant limitations in functioning, the economic burden related to musculoskeletal chronic diseases is substantial and the impact of these disorders on individuals and on society is expected to increase dramatically [1, 3]. In a recent health survey targeting the burden of diseases across chronic conditions, the impact of disorders like osteoarthritis, low back pain, fibromyalgia and osteoporosis was considered comparable to the impact of major diseases such as cardiac conditions [4]. In musculoskeletal disorders indirect costs are usually predominant and greater than direct costs due to productivity loss costs [1]. However, for lifelong musculoskeletal disorders like osteoarthritis, osteoporosis or low back pain, which affect a considerable number of older and already retired persons, as well as for patient populations with high health resource consumption like fibromyalgia patients, the use and more specifically the high use of health care services and the resulting direct costs are of concern for public health policy makers [5]. According to estimates of the German Federal Statistic Office direct costs related to musculoskeletal chronic diseases were estimated to amount to €25.2 billion in 2002 [6].

Osteoarthritis can be characterized by loss of joint cartilage leading to pain and loss of function mainly in hips and knees, is strongly associated with aging and the course of the disease is often progressive [1]. Because it is not a simple disease entity, it is difficult to estimate incidence and prevalence [7] but high prevalence is always attested wherever such statistics are available [8]. It is supposed that worldwide about 10% of persons over the age

60 have clinical problems related to osteoarthritis [7]. In Australia a prevalence of 2.65% for males and 4.17% for females was estimated [7]. The financial burden specifically of posttraumatic osteoarthritis were estimated to be $3.06 billion annually in the USA [9]. Total annual disease costs were estimated to amount to $5700 in Canada [10]. Average total annual osteoarthritis-attributable costs in Spain were €1502 per patient and direct costs accounted for 86% of the total cost [11]. Excluding joint replacement, direct costs related to osteoarthritis in Hong Kong ranged from Hong Kong dollar $11,690 to $40,180 per person per year [12]. In general, the economic burden of arthritis ranges between 1% and 2.5% of the gross national product of western nations [8].

Osteoporosis is characterized by low bone mass and deterioration of bone tissue with consequent increase in susceptibility to fractures and is strongly associated with aging as well as with being female [1]. The prevalence of osteoporosis is estimated to be 54% in postmenopausal women in the USA, 23% in women aged >50 years in the United Kingdom and even 70% among American women by the age of 80 years [1, 13]. In the year 2003 7.8 million Germans (6.5 women) suffered from osteoporosis, equalling a prevalence rate of 39% in women and 9.7% in men [14]. Worldwide it is estimated that over 200 million people suffer from osteoporosis [15]. Fractures associated with osteoporosis are highly related to pain, mortality and loss of mobility and consequently a considerable burden to health care systems [13]. More than 2 million incident fractures at a cost of $17 billion were predicted in the USA for the year 2005 and total estimated costs including prevalent fractures exceeded 19$ billions [16]. In Germany 108.341 osteoporosis-attributable hip fractures were associated to direct costs amounting to 2736 millions of Euros [17]. In 2003 total direct costs attributable to osteoporosis in Germany amounted to €5.4 billion [14].

Back pain can be defined as acute, sub-acute or chronic if it lasts less than six weeks, between six weeks and three months or more than three months, respectively. About 90% of cases are

classified as non-specific, i.e. without suspected pathological cause [1]. It is a leading cause of disability and its prevalence and incidence are roughly the same worldwide [18]. Lifetime prevalence varies between 58% and 84% and the point prevalence between 4% and 33% [1]. The economic burden of back pain is huge wherever it is estimated and a small percentage of patients accounts for a large fraction of costs [19]. However, the methodology used to estimate costs related to back pain markedly differ between studies and leads to a challenging variability of reported direct costs [20]. In a recent review targeting the cost-of-illness of back pain, annual direct costs ranged from about €187 Million in Belgium to over $90 Billion in the USA [20].

Fibromyalgia is characterized by widespread musculoskeletal pain, fatigue and tenderness of unknown aetiology and up to 85% of the patients with fibromyalgia are women of childbearing age or older [21, 22]. The prevalence of fibromyalgia is estimated to range from 2% to 12% in the general population [23] and increases with age [24]. About 15% of patients seen by rheumatologists and 6% of patients in other practice settings are diagnosed as having fibromyalgia [24]. The economic burden of fibromyalgia is substantial since patients show high levels of health resource utilization and comorbidities [21, 25, 26]. Recently estimated total annual healthcare costs per patient were $9573 in the USA [22] and €8654 in Spain [26]. Annual direct costs in the USA are estimated to exceed $14 billion [24].

1.2. Targeting and evaluating the economic burden related to musculoskeletal disorders

Musculoskeletal disorders like osteoarthritis, osteoporosis, back pain and fibromyalgia have in common a chronic and often debilitating course of disease. Patients' functioning is therefore a central aspect of these musculoskeletal disorders and both restoring and optimizing functioning the main goal in healthcare [27, 28]. From the public health perspective, rehabilitation is the strategy in health care whose goal is optimal functioning [28]. Using the terminology of the ICF, the main aim of rehabilitation is "*to enable people with health conditions experiencing or likely to experience disability to achieve optimal functioning in interaction with the environment*" [28].

Rehabilitation of patients suffering from osteoarthritis, osteoporosis, back pain or fibromyalgia is therefore essential and achieves its goal "*by applying and integrating approaches to optimize a person's capacity, approaches which build on and strengthen the resources of the person, which provide a facilitating environment, and which develop performance in the interaction with the environment*" [28]. Due to the increasing economic burden related to osteoarthritis, osteoporosis, back pain, fibromyalgia and the limitability of health resources, an additional task of rehabilitative interventions is the reduction of excessive direct costs related to inappropriate disease management [29].

The evaluation of the effectiveness of rehabilitation programs is essential to determine whether a program achieves its goals. Since reducing excessive direct costs is also a task of rehabilitation, it is no more sufficient to design research studies simply addressing the question whether new interventions or services are effective [30]. Rehabilitation programs have to be examined not only with regard to effectiveness but also to cost-effectiveness, which means with regard to the relation between resources used and resulting outcome. The inclusion of alongside economic evaluations, targeting mostly a cost-effectiveness analysis of

such rehabilitation programs, is therefore fundamental and has often become a prerequisite to get research projects granted in the field of rehabilitation in Germany.

However, clinical researchers are often overstretched by the need to perform an economic evaluation. Firstly, obtaining sound health resource use data is a challenge. On the one side, the access to health insurance data is restricted and its evaluation very complex [31, 32]. On the other side, there are almost no self-administered questionnaires available for routine health care resource use data collection. Secondly, guidelines on economic evaluations are quite complex in their terminology and very comprehensive sets of cost categories are proposed to be included in economic evaluations [33, 34]. These comprehensive sets are very important to economists targeting cost-of-illness studies but become a barrier to clinical researchers targeting pre-post or between-group comparisons alongside their clinical studies. Thirdly, if a new intervention is expected to be cost-effective, it is important to know what to target in rehabilitation in order to achieve cost-effectiveness. It is traceable that rehabilitation programs aiming solely at clinical outcomes cannot be expected to reduce excessive direct costs to the same degree as interventions that directly aim at outcomes that have an immediate impact on health care resource consumption. The cost-effectiveness goal has also to be considered in the development phase of the rehabilitation programs, i.e. what to target in order to avoid the incurrence of excessive and avoidable costs must be a clearly defined priority.

Due to the importance of alongside economic evaluations of clinical studies among patients with musculoskeletal disorders, it is essential to establish the parameters necessary to perform sound economic evaluations routinely. In order to establish those parameters and facilitate economic evaluations alongside studies targeting the effectiveness of rehabilitation programs, it is essential to firstly define methods of measuring health care resource utilization, i.e. to define how to measure. Secondly, it is crucial to identify which health

resource utilization domains are relevant and sufficient to estimate reliable figures of direct costs in order to perform pre-post or between-group cost analyses, i.e. to define what to measure. Thirdly, when designing rehabilitation programs for musculoskeletal patients targeting also the reduction of excessive and avoidable costs related to medical treatment, it is important to consider which factors are determining such costs in the development phase of new interventions, i.e. to define what to target.

1.3. Measurement of health care resource utilization

A crucial and challenging task in an economical evaluation is the sound measurement of health care resource utilization. Most relevant cost data can be obtained from computerized medical and health insurance records, which can be expected to provide accurate and detailed information on health care resource use. However, the access to this data is restricted, the analysis complex and very detailed extra written informed consents are needed due to legal data protection [31, 32].

Consequently, researchers in the field of health economics frequently use data obtained from self-administered questionnaires, which are almost always feasible but potentially vulnerable to recall bias. Disparities between information from self-reported questionnaires and from provider's records have been indeed often described and recall bias seem to depend on the duration of the recall period and on the saliency of the health service [35]. While a tendency towards under reporting could be identified for physician visits [36, 37], emergency room and physiotherapists visits tended to be slightly over reported [36, 38].

Despite the vulnerability of self-reported information to recall bias, some studies show that patient reported data can also be accurate for specific categories. No significant differences between patients' and providers' reports with respect to hospital days and outpatient visits were found in two studies [37, 39]. Further studies aiming for precision and accuracy of self-administered questionnaire data on sick leave showed that patients report their productivity losses adequately provided that recall periods are not longer than 3 months [40, 41].

Owing to the fact that measures of resource utilization are often applied on an ad hoc basis [42], many efforts have been made in the past years to improve the quality and reliability of self-administered questionnaires [31, 43]. In a comprehensive review targeting cost domains used in economic evaluations of rheumatic diseases, a preliminary scheme to

categorize cost assessment was proposed [33]. Moreover, a generalized matrix of applicable resource utilization domains for musculoskeletal conditions has been developed [34].

However, few standardised self-completion resource use questionnaires have been developed and validated in the past decade. An instrument for use in economic studies of early inflammatory polyarthritis was developed, pilot-tested and validated in the UK [44]. Similarly, a Canadian group developed and tested the feasibility and validity of a questionnaire to assess health care utilization after occupational low-back pain (LBP) [45]. In addition, the health economic questionnaire for rheumatoid arthritis (HEQ-RA) was developed and validated in Germany [41, 46].

Due to this scarcity of standardised and validated instruments, many studies develop their own questionnaires to assess health care resource utilization but rarely describe instrument characteristics. However, to enhance the process towards standardized and validated self-administered questionnaires it would definitely be beneficial if studies would report their self-developed questionnaires.

1.4. Identification of relevant health care use domains

Economic evaluations in chronic musculoskeletal conditions show a challenging inconsistency in reported direct medical costs. Recent reviews as well as a survey targeting economic evaluations in the indications low back pain, osteoarthritis and rheumatoid arthritis pointed out that the wide rage of direct cost estimates within a medical condition restricts the comparability of studies significantly [20, 47, 48].

Variability in the dimension of direct medical costs can be explained by the design of economic evaluations, i.e., the choice of different perspectives, diverse health care systems and different data sources, among others. However, one of the key factors leading to hardly comparable direct medical costs is the substantial variability of health resources categories used to estimate costs [20, 47, 49].

Owing to the lack of standardization, matrixes of applicable cost categories have been developed in the past years for musculoskeletal conditions [33, 34]. Authors suggest that at least visits to physician, outpatient surgery, non physician service utilization, drug expenses, diagnostic/therapeutic procedures and tests, emergency room visits, aids and devices, inpatient acute hospital facilities with or without surgery and nursing homes and rehabilitation should be included in any analysis [34].

However, the selection of cost categories during the development of an economic evaluation depends strongly on the purpose of the study. Comprehensive core sets of cost categories are fundamental to perform cost-of-illness studies targeting the economic burden of a disease. In contrast, in economic evaluations alongside cohort studies, which are targeting either pre-post or between-group cost comparisons, brief core sets of most relevant cost domains including as many categories as necessary and as few as possible are recommended [36, 50]. In fact, some recent economic evaluations have included only four cost categories [physician

visits, medication, inpatient treatment, non physicians service use] to estimate direct medical costs [51-54].

Thus, it is crucial to identify which resource utilization domains are relevant and sufficient to estimate reliable figures of direct medical costs in order to perform pre-post or between-group cost analyses. The decision on which categories to use can be elicited by ranking the percentage of direct medical costs represented by each cost category. In doing so, it is important to decide on a cut-off. Categories have been considered of minor importance if they contribute to less than 1% of the total direct costs [53, 55]. However, any cut off is somewhat arbitrary and will depend on the purposes of the study.

1.5. Determinants of direct medical costs

An in-depth understanding of the determinants of the economic burden related to the medical treatment of musculoskeletal diseases is the prerequisite to develop tailored cost-saving rehabilitative interventions.

During the last decade, many studies have attempted to identify determinants of direct costs among patients with chronic musculoskeletal conditions. Functional status measured by health related quality of life (HRQoL) instruments was a relevant predictor across musculoskeletal conditions. In RA the Health Assessment Questionnaire (HAQ) was consistently an important predictor of direct costs [5, 56-59]. In addition to the HAQ comorbidity, sociodemographic characteristics [60] and the mental health scale of the Medical Outcomes Study Short Form-36 (SF-36) [61] were identified as predictors. The HAQ was also the most pronounced predictor of direct costs beyond the median among patients with a disease duration of more than two years [62]. In fibromyalgia the number of comorbidities and the fibromyalgia disability, measured with the Fibromyalgia Impact Questionnaire (FIQ), were significant determinants of direct costs [59, 63]. Additionally, one study among fibromyalgia patients identified not only comorbidity and disability but also health status, disease severity, perceived self-efficacy, depression and social support as predictors of direct costs beyond the median [64]. In osteoarthritis (OA) the Western Ontario Osteoarthritis Index (WOMAC) stiffness, duration of disease and gender were determinants of out-of-pocket expenditures [65], while poorer scores in the dimensions of the SF-36 were a major determinant of direct costs [66]. A study targeting specifically the impact of HRQoL instruments on future health care resource use in patients with RA and osteoarthritis also concluded that SF-36, HAQ as well as the WOMAC were all strong predictors of future health care resource consumption [5].

However, there is a lack of studies aiming to identify the determinants of direct costs among patients with osteoporosis or back pain and few studies specifically targeted determinants of high direct costs (beyond the median) among patients with chronic musculoskeletal disorders [62, 64]. Yet, the understanding of determinants of direct medical costs across medical conditions is of major importance regarding the development and implementation of efficient rehabilitative interventions. Efficient interventions should aim not only for improvements in functioning but also for a reduction of high and avoidable direct medical costs. Since such interventions can only be developed if the target population is clearly defined, the identification of subjects at risk of incurring high and potentially avoidable direct medical costs is essential.

2. Research Objectives

The overall objective of this doctoral thesis is to address some of the conditions necessary to routinely perform alongside economic evaluations of rehabilitation programs.

The specific aims are to 1) present a standardized instrument to collect data about health care resource use, 2) identify major cost categories of direct medical costs to be used in comparative economic evaluations of subjects with musculoskeletal diseases and 3) identify determinants of direct medical costs among subjects with musculoskeletal diseases.

This doctoral thesis is therefore divided into three parts. In the first part a standardized instrument to collect health care resource use in the context of rehabilitation is described and lessons learned are discussed. In the second part major direct medical costs categories among patients with musculoskeletal conditions undergoing outpatient rehabilitation are identified, and in the third part determinants of direct medical, as well as of direct medical costs above the median incurred by chronic musculoskeletal patients, are examined. Each of these parts contains a specific discussion section referring to their specific results.

3. "Development of an instrument to collect health care resource use data in the context of rehabilitation"

3.1. Objective

The general objective of this part of the doctoral thesis is to describe an instrument to collect health resource utilization data and to discuss lessons learned. The instrument to collect health care resource use data described here could not be validated so far. However, much could be learned from the application of the standardized questionnaire. These insights can contribute to other groups embarking in similar studies and can support the realization of a standardized and validated self-administered general questionnaire suitable for the collection of relevant cost data in rehabilitation interventions.

3.2. Methods

The questionnaire to collect health resource utilization data was developed for the economic evaluations of five rehabilitation studies funded by the German Federal Ministry of Education and Research (BMBF). The development was based on the methodological standards of health costs data assessment proposed by the "Working Group Methods in Health Economic Evaluation" (MEA) [67, 68].

Considering the health condition of study patients, specific questions of each associated study and recommendations of the MEA, it was decided which health resource use components should be part of the questionnaire and which recall period would be adequate. All questions in the health resource use assessment questionnaire referred to the underlying disease targeted in the rehabilitation or prevention program. All questions had a first dichotomous level of aggregation (Yes/No) and included a table requesting further detailed information about health resource use.

Health resource utilization data was collected to estimate direct medical, direct non medical and indirect costs. Estimated figures were used either to compare costs before and after interventions or to perform incremental cost-effectiveness analyses. In order to estimate direct medical cost categories data was collected about outpatient medical care, day care treatment, inpatient treatment, outpatient hospital treatment, medication, non physician service utilization, emergency service and aids and devices. In order to estimate direct non medical cost categories data about sport, relative's care giving, participation in self-help groups (leisure time loss) and transportation costs was collected. The question targeting transportation costs was a sub item of the items outpatient medical care, day care treatment, outpatient hospital treatment and non physician service utilization. Only patients who used at least one of the services described above were asked to give further information on transportation costs. In order to estimate indirect costs data about days of sick leave of gainfully employed persons and early retirement was requested.

In order to validate the instrument, a data evaluation of records of a compulsory insurance fund was planned for two studies. A comparison of information obtained with the questionnaire regarding day care treatment, inpatient treatment, aids and devices, non physician service utilization and days of sick leave with insurance records data was intended.

3.3. Results

The standardized self-administered retrospective health resource use assessment questionnaire was answered by a total of 1042 subjects with one of the following indications: osteoarthritis, osteoporosis, back pain, cancer, fibromyalgia or brain/cranial traumata.

Table 1 Summary of associated studies.

Study	S1	S2	S3	S4	S5
Main goal	Group psychotherapy of dysfunctional fear of progression in patients with chronic arthritis and cancer	Feasibility of the Willingness-to-pay methodology for expected and perceived health effects	Evaluation of a comprehensive skills-oriented cognitive therapy in the neurological rehabilitation	Evaluation of a multidisciplinary prevention program for nurses with low back pain	Evaluation of a multimodal therapy program for fibromyalgia patients
Study Population[1]	348	338	115	169	72
Indications (N)	Cancer (174) Osteoarthritis (174)	Osteoarthritis (97) Osteoporosis (98) Back pain (143)	Traumatic Brain Injury (115)	Back pain (169)	Fibromyalgie (72)
Patient recruiting	October 2002 to December 2003	1. Quarter 2003 to 1. Quarter 2005	January 2003 to June 2006	July 2003 to February 2005	October 2002 to April 2003
Type of Study	RCT	Longitudinal study	RCT	RCT	Prospective cohort study
Context	Rehabilitation	Rehabilitation	Rehabilitation	Prevention	Rehabilitation
Data assessment[2]	12 months pre 3 months post 12 months post	12 months pre 6 months post	6 months post 12 months post	12 months pre 3 months post 12 months post	6 months pre 6 months post
Cost Categories	Direct medical costs Direct non medical costs Indirect costs	Direct medical costs Direct non medical costs Indirect costs	Direct medical costs Direct non medical costs Indirect costs	Direct medical costs Direct non medical costs Indirect costs	Direct medical costs Direct non medical costs Indirect costs

The five associated studies were: "*Group psychotherapy of dysfunctional fear of progression in patients with chronic arthritis and cancer*" (S1) [69, 70]; "*Feasibility of the Willingness-to-pay methodology for expected and perceived health effects*" (S2) [71]; "*Evaluation of a comprehensive skills-oriented cognitive therapy in the neurological rehabilitation*" (S3) [data not published.];

[1] Number of patients who answered the questionnaire
[2] Pre or post intervention

"*Evaluation of a multidisciplinary prevention program for nurses with low back pain*" (S4) [72]; and "*Evaluation of a multimodal therapy program for fibromyalgia patients*" (S5) [data not published]. Study design of each associated study is described in detail in Table 1. The versions of the questionnaire adapted for each study are presented in the Appendix except for the versions of study S1. Study S1 integrated the questions targeting ressource use in their own case record form. The health resource use categories selected to be collected in each study are presented in Table 2.

Table 2 Cost categories assessed in the five associated studies. An "X" means that the category was included in the questionnaire.

Cost category	**Study**				
	S1: Group psychotherapy of dysfunctional fear of progression in patients with chronic arthritis and cancer	S2: Feasibility of the Willingness-to-pay methodology for expected and perceived health effects	S3: Evaluation of a comprehensive skills-oriented cognitive therapy in the neurological rehabilitation	S4: Evaluation of a multidisciplinary prevention program for nurses with low back pain	S5: Evaluation of a multimodal therapy program for fibromyalgia patients
Outpatient medical care	X	X	X	X	X
Day care treatment	X	X	X	-	X
Inpatient treatment	X	X	X	X	X
Outpatient hospital treatment	X	X	-	-	X
Rehabilitation	-	-	-	X	-
Medication	X	X	X	X	X
Non physician service utilization	X	X	X	X	X
Emergency service	-	X	X	X	X
Aids and Devices	X	X	X	X	X
Sport	-	-	-	X	-
Adaptations/rebuilding at home	-	-	X	-	-
Relatives care giving	X	X	-	-	-
Occupational Training	X	X	X	X	X
Self help groups	X	X	X	-	X
Transportation costs	-	X	X	-	X
Retirement	X	X	X	-	X
Sick leave	X	X	X	X	X

The cost categories outpatient medical treatment, inpatient treatment, medication, non physician service utilization, devices and aids, occupational training and sick leave days were collected in all studies. Cost components are described in Table 3.

Direct medical costs. In the question about outpatient medical care data concerning general practitioner and specialists visits was requested. Data requested about non physician outpatient service always included information about physiotherapy, massage, occupational therapy, psychotherapy and alternative practitioner therapy. The more detailed further information was requested on these items, the higher the percentage of incomplete answered questions at baseline and in the follow up. Comprehension problems were identified in the question about outpatient treatment in a hospital. Patients often could not differentiate between day care treatment in a hospital and outpatient treatment in a hospital. In the initial version of the questionnaire many double answers regarding medication were identified if information about both prescribed and out-of-pocket medication were separately requested in two questions. Information about medication was therefore summarized in a single question in the following versions.

Direct non medical costs. Data collected about sport activities, relative's care giving and participation in self-help groups aimed to calculate the amount of leisure time lost because of the disease. Considering the monetary valuation there was no need of further information beyond the number of hours spent with the activities described above. The item transportation cost was very poorly answered and so could not be included in the calculation of the direct non medical costs.

Indirect costs. Data about early retirement and days of sick leave was collected to estimate indirect costs. In order to avoid answers from retired or unemployed patients, only gainfully employed persons were requested to give information about sick leave and early retirement. In Germany, employed subjects do not need to present a sick certificate in the first three

days of absenteeism due to sickness. We asked therefore for sick leave days from the very first day with and without medical certificate. Information about temporal limited absenteeism due to visits to a physician, for instance, was also requested but poorly answered, so that it could not be considered in the calculation of indirect costs.

Table 3 Aggregation level of cost categories included in the instrument to collect health resource use.

Categories	Subcategories	Physical units	Further information	Recall period
Outpatient medical care	❖ general practitioner ❖ Specialists (as orthopaedists, internist, neurologist and etc.) ❖ another physicians (without specification)	❖ Number of visits		❖ last 4 weeks ❖ S4: total researched period
Hospital treatments	❖ Inpatient ❖ Outpatient ❖ Day care ❖ Rehabilitation	❖ Length of stay/treatment	❖ Hospital specification ❖ Clinic specification ❖ Diagnosis	❖ Total researched period, not asked at the 3 months follow up ❖ Outpatient: last 4 weeks
Medication	❖ Prescribed ❖ Out of pocket	❖ Piles or Infusions a day ❖ Additional payment	❖ Drug name	❖ Last 4 weeks ❖ S5: last week
Non physician service utilization	❖ Physiotherapy ❖ Massage ❖ Occupational therapy ❖ Psychotherapy ❖ Alternative Practitioner ❖ Other Interventions	❖ Number of interventions	❖ Specification of the intervention	❖ Last 4 Weeks ❖ S2 and S4: total researched period
Emergency Service	❖ Emergency room ❖ Doctor on call ❖ Ambulance without physician ❖ Ambulance with physician	❖ Number of services		❖ Total researched period, not asked at the 3 months follow up
Aids and devices	❖ None	❖ Price ❖ Out of pocket expenditures	❖ Aids/devices specification	❖ Total researched period, not asked at the 3 months follow up

Table 3 (cont.): Aggregation level of cost categories included in the instrument to collect health resource use.

Categories	Subcategories	Physical units	Further information	Recall period
Sport	❖ Gymnastic course ❖ Gymnastic at home ❖ Swimming ❖ Fitness centre ❖ PMR ❖ Autogenic training ❖ Another sport	❖ Number of hours per week ❖ Number of months		❖ Total researched period, not asked at the 3 months follow up
Home adaptations or rebuilding	❖ None	❖ Price, if known	❖ Adaptation specification ❖ Cost carrier	❖ Total researched period
Relatives care giving	❖ Home nursing ❖ Escort for medical appointments ❖ Collection of medication ❖ Help in housekeeping ❖ Other form of help	❖ Number of hours per week	❖ What was done	❖ Last 4 weeks
Occupational retraining	❖ Occupational retraining ❖ Occupational training ❖ On-the-job training ❖ Other training	❖ Number of weeks	❖ Cost carrier	❖ Total researched period, not asked at the 3 month follow up
Participation in self help groups	❖ None	❖ Number of months ❖ Number of hours per month		❖ Total researched period, not asked at the 3 month follow up
Transport-ation costs	❖ None	❖ total costs	❖ Transport mean specification	❖ due to physician visits, no physician interventions, outpatient and day care treatment in a hospital
Retirement	❖ Receiving a pension ❖ Applied for a pension ❖ Granted a pension	❖ Retirement date	❖ Pension specification	❖ Total researched period, not asked at the 3 months follow up
Sick leave	❖ Sick leave days with medical certificate ❖ Sick leave days without medical certificate ❖ Temporal limited absenteeism due to visits to i.e. physician	❖ How many days ❖ How many hours (limited absenteeism)		❖ Total researched period

3.4. Discussion

The general objective of this paper was to describe the development of an instrument to collect self-reported health resource utilization, its application in five rehabilitation studies and to discuss lessons learned. The questionnaire was answered satisfactorily and provided enough information to calculated direct medical, direct non medical and indirect costs.

The vulnerability of self-reported information to recall bias is a major issue of patient-reported data. As no objective data was available, assumptions about the impact of our recall periods on cost figures can not be made. It has been shown that the tendency to report less accurate service utilization appears to be exacerbated when the recall period is extended [35]. Since short recall periods of four weeks were used to assess information on medication, physician visits, relatives care giving and non physician service utilization, the probability of recall bias regarding these categories is low. The longer recall period of six months or more used to assess inpatient treatment has been considered adequate in the literature [37, 39]. However, the recall period of six months or more used for emergency services, aids and devices, sport, rebuilding, participation in self-help groups and sick leave might have been problematic. Especially the accuracy of sick leave information was shown to work better for short periods of time up to 3 months [40, 41].

The questionnaire used to collect health resource utilization was adapted considering the needs of each associated study. However, no advantage in adapting the original questionnaire could be observed. It could be learned that the level of detail regarding outpatient medical care, non physician service utilization, sport and relatives care giving was too comprehensive and became very sensitive to missing values with no advantages for the economic evaluation. Indeed, the inclusion of highly aggregated items rather than very detailed questions has already been suggested [36, 46]. The decision on which health resource use components should be part of the questionnaire was based on the underlying

health condition of study patients, specific questions of the associated studies and recommendations of the MEA. However, the aims of the alongside economic evaluations were either the pre-post or between-group comparison of costs before and after interventions or a cost-effectiveness analysis. The use of a core set of major cost categories would have been therefore more appropriate in order to guarantee the comparability of results across studies. Indeed, economic evaluations in rehabilitation frequently include only major cost categories as medication, physician visits, non physician services use and inpatient treatment to estimate direct medical costs [51-54].

The development of a general and brief instrument to collect health resource use including only major categories is crucial to enhance the process towards comparable alongside economic evaluations in the field of rehabilitation. Due to the scarcity of standardized instruments to collect health resource use, the development of such an instrument would guarantee standardization and comparability between studies and across indications. Indeed, the use of pre-defined major cost categories, which should be covered by each socio-economic evaluation, has already been suggested [73].

A limitation of the questionnaire is that it could not be validated. This happened because of reservations regarding the need of an extra informed consent and because one project did not recruit as many patients as required from the health insurance fund to deliver information. Indeed, similar problems with the validation of cost data are quite usual and have already been described [38, 45].

The development of a standardized general brief questionnaire to collect health resource use with predetermined cost categories is important to enhance the process towards standardization of economic evaluations. However, the validation of such an instrument is essential and needs further research. The development of additional "disease-related

modules" that could be added to the general questionnaire if disease-specific information is needed is also recommendable.

4. "Identification of major direct medical cost categories among patients with musculoskeletal conditions undergoing outpatient rehabilitation"

4.1. Objective

The general objective of this part of the doctoral thesis is to identify major cost categories of direct medical costs among patients with musculoskeletal conditions undergoing a rehabilitation program. The specific aims are 1) to identify major cost categories in our population and 2) to report means and 95% confidence intervals calculated with or without minor important categories.

4.2. Methods

The present evaluation was performed alongside two cohort studies and included 410 patients with indications of fibromyalgia, osteoarthritis, osteoporosis or back pain undergoing outpatient rehabilitation at the Department of Physical Medicine and Rehabilitation of the University Hospital Munich. Further inclusion criteria were: patients were at least 18 years old and had agreed to participate in the study by written, informed consent. General exclusion criterion was poor command of the German language. Fibromyalgia subjects were also excluded in cases of severe concomitant physical or mental illnesses. Fibromyalgia patients took part in a cohort study targeting the effect of a psychological group intervention on patient's locus of control (data not published). Osteoarthritis, osteoporosis and back pain subjects took part in a prospective cohort study targeting the feasibility of the willingness-to-pay methodology for expected and perceived health effects [71].

Resource consumption was assessed with the self-report retrospective questionnaire to collect health resource use reported in the first part of this doctoral thesis. Patients

answered the questionnaire at baseline and six months after the intervention. The cost categories considered were outpatient physician services, non physician health services, medication, inpatient treatment, outpatient treatment in a hospital, emergency services, aids and devices, participation in self-help groups, nursing care from relatives and sick leave days. Outpatient treatment in a hospital was very poorly answered and therefore not included in the calculation of the direct medical costs.

This work was performed from the societal perspective. Resource use volumes were combined with unit costs to obtain a net cost per patient over the entire period and extrapolated to obtain annual figures. Medication was valuated on the basis of prices of the online German drugs index book [74]. Devices and aids were valuated with prices charged by a Bavarian health insurance fund [75]. All other index costs were proposed by the Working Group Methods in Health Economic Evaluation (AG MEA) [43, 67, 68]. These index costs were extrapolated for 2004 using a factor of 0.025 for the first year and 0.020 for the following years. All costs were calculated in Euros for the year 2004.

We discriminated minor from major cost categories ranking the percentage of direct medical costs represented by each cost category and using a cut off of 5%, i.e., cost categories contributing to less than 5% of the direct medical costs at baseline were considered to be of minor importance. Mean [95% CI] estimates of direct medical costs calculated either with all available cost categories or solely with major resource utilization domains are reported.

In order to be informative for health care policy decisions, cost analyses have to report arithmetic mean costs since only these will enable the calculation of total treatment costs [76]. Standard non-parametric methods as well as the report of medians are therefore not appropriate for economic evaluations. However, as cost data is usually highly skewed distributed, original arithmetic means tend to be biased so that bootstrap techniques are recommended to estimate valid arithmetic means. Hence, we used non parametric bootstrap

techniques with 1000 replications in order to estimate means and 95% confidence intervals [95% CI]. Statistical calculations were performed using SPSS version 14.0.

4.3. Results

Socio-demographic characteristics of our sample are described in Table 4. Direct medical costs were available for 301 (73.4%) subjects at baseline and for 291 (71%) subjects at the follow up. The 104 drop outs at the follow up did not differ from participants regarding age, sex, work force participation, indication, educational level, comorbidity score and direct medical costs at baseline.

Table 4: Baseline characteristics of the study population. Values are n (percentages) and means (SD).

Variables (Baseline)	Osteoarthritis	Osteoporosis	Back Pain	Fibromyalgia	Total
N	97	98	143	72	410
Female (%)	66 (68)	83 (84.7)	97 (67.8)	72 (100)	318 (77.6)
Age (years) mean (SD)	66.56 (10.53)	66.85 (7.63)	52.91 (14.22)	53.49 (8.62)	59.57 (13.00)
Subjects living in partnership (%)	52 (53.6)	49 (50.0)	84 (58.7)	50 (69.4)	235 (57.3)
Subjects with high educational level (%)	36 (37.1)	34 (34.7)	70 (49.0)	10 (13.9)	150 (36.6)
Subjects with paid work (%)	15 (15.46)	8 (8.16)	68 (47.55)	35 (48.6)	126 (30.73)
Retired (%)	61 (62.9)	66 (67.3)	29 (20.3)	17 (23.6)	173 (42.2)

The percentage of each cost component in the sum of direct medical costs is displayed in Table 5. The cost categories emergency services and aids and devices were contributing in all indications to less than 5% of the direct medical costs and therefore considered in this study as minor categories. Major cost categories were outpatient physician visits, non physician services, medication and inpatient treatment.

Means estimated with all categories, as well as means estimated with major categories, are displayed in Table 6. Means and [95% CI] estimated with major categories are very similar

to the ones estimated with all categories. Since all 95% CI are overlapping, no statistic significant differences between the means can be inferred.

Table 5: Percentages of health resource use categories in the sum of direct medical costs before and after a three week rehabilitation program.

Direct medical cost categories	Osteoarthritis		Osteoporosis		Back Pain		Fibromyalgia	
	Before	After	Before	After	Before	After	Before	After
Medication	47.29	31.49	62.04	69.99	26.07	43.69	13.75	18.99
Non physician services	11.90	13.73	12.71	13.38	11.96	17.11	37.51	34.00
Physician visits	25.12	18.46	12.13	14.61	27.66	20.71	31.8	28.37
Inpatient treatment	12.16	33.52	11.98	0.97	29.86	16.46	13.91	17.12
Aids and devices	3.53	2.69	0.52	1.01	2.14	2.03	1.71	1.29
Emergency services	0	0.11	0.62	0.04	2.31	0	1.32	0.23

Table 6: Estimated means [95% confidence intervals] of direct medical costs calculated with major or with major and minor cost categories 12 months prior to rehabilitation and 12 months after rehabilitation. Means and bias corrected and accelerated confidence intervals were estimated with 1000 bootstrap replications.

	Osteoarthritis (N=97)		Osteoporosis (N=98)		Back Pain (N=143)		Fibromyalgia (N=72)	
Before Rehab	**Major and minor categories**	**Major categories**	**Major and minor categories**	**Major categories**	**Major and minor categories**	**Major categories**	**Major and minor categories**	**Major categories**
Mean	1627.75	1510.85	2039.84	2023.85	2071.26	1963.00	4783.06	4663.04
95% CI	[1234.63; 2014.57]	[1178.57; 1905.19]	[1459.45; 2677.86]	[1484.73; 2583.72]	[1439.31; 2812.44]	[1341.32; 2548.28]	[3608.36; 6187.19]	[3444.27; 6015.10]
After Rehab	**Major and minor categories**	**Major categories**	**Major and minor categories**	**Major categories**	**Major and minor categories**	**Major categories**	**Major and minor categories**	**Major categories**
Mean	1833.86	1725.25	2032.05	2030.63	1376.04	1523.03	3851.17	3894.07
95% CI	[1122.83; 2629.96]	[1031.26; 2514.58]	[1439.28; 2720.07]	[1460.10; 2686.85]	[890.35; 1925.27]	[986.08; 2198.71]	[2709.98; 4885.32]	[2781.54; 4957.09]

4.4. Discussion

In this part of the doctoral thesis we aimed to identify major cost categories of direct medical costs among patients with musculoskeletal conditions undergoing rehabilitation programs. The main result is the identification of the following major categories: a) medication, b) physician visits, c) non physician services use and d) inpatient treatment.

The assessment of economic outcomes in rehabilitation research of patients with a musculoskeletal condition has increased significantly in the past decade and the set of identified major direct medical cost categories has already been used to estimate costs. In back pain the inclusion of economic evaluations is widespread in rehabilitation studies targeting pre-post or between-group comparisons and the major categories medication, physician visits, non physician services use and inpatient treatment were frequently considered sufficient to estimate and compare direct medical costs [52-54, 77, 78]. Also a study targeting the cost of illness among fibromyalgia, back pain and ankylosing spondylitis patients used solely the cost categories described above to estimate direct medical costs [51]. In contrast, a review of 41 economic evaluations among patients with osteoarthritis and osteoporosis found a total of 34 direct medical cost categories used [34].

Comprehensive and extensive matrixes of applicable cost categories proposing relevant cost categories for cost evaluations have already been developed for musculoskeletal conditions [33, 34]. However, the selection of cost categories during the development of an economic evaluation depends strongly on the purpose of the study. Comprehensive core sets of cost categories are fundamental to perform cost-of-illness studies targeting the economic burden of a disease. In contrast, in economic evaluations alongside cohort studies, which are targeting either pre-post or between-group cost comparisons, brief core sets of most relevant cost domains including as many categories as necessary and as few as possible are recommended [36, 50].

Indeed, there are a number of arguments as to why it is advantageous to minimize the number of cost categories. Firstly, as economic evaluations are often piggyback studies alongside clinical studies, economic variables might be considered of secondary importance by clinical researchers [79]. We can therefore assume that instruments used to collect health resource use are more likely to be well-accepted by researchers and patients if they are as brief as possible. Secondly, cost data obtained using a brief core set of major direct medical cost categories can improve comparability across indications, which is of interest for public health policy makers and crucial in order to allow optimal allocation of resources. Thirdly, missing values are common even in carefully designed economic studies and become challenging in the analysis because of the highly skewed distribution of cost data [79]. As the direct medical cost is a sum of many cost categories, the probability of incomplete data, as well as the consequential need of complex imputation methods for generating "substitute" values, can be potentially diminished with the reduction of items in the sum.

When interpreting our results, it is important to keep in mind that there is no standardized procedure to identify major direct medical cost categories. Indeed, we used an arbitrary cut-off of 5% to discriminate major from minor important cost categories. This cut-off was in line with the purposes of our economic evaluations but is higher than another arbitrary cut-off of 1% reported in the literature [53, 55]. However, while we tried to find major categories for four musculoskeletal indications, both of the mentioned studies focused on a single musculoskeletal condition [53, 55]. Including four different medical conditions in one sample required a higher cut-off in order to identify shared major categories. We have actually shown that estimated means do not importantly change if cost components contributing to less than 5% of the direct medical costs are excluded from the sum.

Our study has some limitations. Firstly, we used a self-report standardized questionnaire to collect retrospective information about health care resource, and this kind of data source is susceptible to recall bias and secondly, we extrapolated part of the costs to obtain annual figures conservatively assuming that resource use increases constantly.

In summary, we have identified a) medication, b) physician visits, c) non physician services use and d) inpatient treatment as major direct medical cost categories for our sample including osteoarthritis, osteoporosis, back pain and fibromyalgia patients. The development of a standard brief core set of major direct medical cost categories for musculoskeletal conditions is important regarding the standardization and comparability of alongside economic evaluations. The major cost categories we identified can serve as candidate categories and contribute to enhance the process towards a standard brief core set of major cost categories for musculoskeletal conditions, which should be included in the alongside economic evaluation of rehabilitative interventions.

5. "Determinants of major direct medical cost categories among patients with osteoporosis, osteoarthritis, back pain and fibromyalgia undergoing outpatient rehabilitation"

5.1. Objective

The objective of this part of the doctoral thesis is the identification of determinants of direct medical costs among patients with osteoporosis, osteoarthritis, back pain and fibromyalgia undergoing outpatient rehabilitation.

5.2. Material and Methods

The present evaluation was performed alongside two cohort studies including patients with medical indications of fibromyalgia, osteoarthritis, osteoporosis or back pain undergoing outpatient rehabilitation at the Department of Physical Medicine and Rehabilitation of the University Hospital Munich. The study population is described in detail in section 4.2.

The unifying framework of concepts and terminology proposed by the "International Classification of Functioning, Disability and Health" (ICF) was used as a basis for the selection of measures [2]. The ICF comprehensively covers all aspects of functioning, which encompasses body structures, body functions, activities and participation and is viewed in relation with the health condition, personal and environmental factors [80]. In order to cover health condition extensively we collected data about comorbidity using the self-administered comorbidity questionnaire (SCQ) [81]. In order to cover body functions as well as activities and participations we used the eight scales (physical functioning, role physical, bodily pain, general health perception, vitality, social functioning, role emotional, mental health) of the SF-36 [82]. In order to cover personal factors demographic data was collected. Resource consumption was assessed with the self-report retrospective

questionnaire to collect health resource use reported in the first part of this doctoral thesis. Patients answered all questionnaires at baseline.

Cost categories considered to calculate direct medical costs were outpatient physician services, non physician health services, medication and inpatient treatment. These categories were already identified in the second part of this doctoral thesis as being major direct medical cost categories in patients with fibromyalgia, osteoarthritis, osteoporosis or back pain. Resource use volumes were combined with unit costs to obtain a net cost per patient and extrapolated to obtain annual figures. Medication was valuated on the basis of prices of the online German drugs index book [74]. All other index costs were proposed by the Working Group Methods in Health Economic Evaluation (AG MEA) [43, 67, 68]. These index costs were extrapolated for 2004 using a factor of 0.025 for the first year and 0.020 for the following years. All costs were calculated in Euros for the year 2004. Due to the skewed distribution of cost data, we used non parametric bootstrap techniques with 1000 replications to estimate means of costs and their 95% confidence intervals [95% CI]. Missing cost data was not imputed.

To identify the determinants of direct medical costs we used two approaches. In order to address determinants of the distribution of direct medical costs a generalized linear model (GLM) with log link function and gamma distribution was performed. The Aikake Information Criterion (AIC) and the Pseudo-R^2 were used to select the best model and to address the explanatory power of the final model, respectively. Additionally, in order to gather a more meaningful interpretation of direct costs a multivariate logistic regression analysis was performed. Due to the usual skewed distribution of costs a suitable, meaningful and current cut-off to dichotomize direct medical costs into high versus low costs is the median of the known distribution [53, 62, 64]. Direct medical costs of more than €1333 (median) were therefore defined as the outcome. A model including all variables of the final

GLM model and a final model using backwards selection were estimated. The area under the ROC curve was used to assess model accuracy in discriminating between high and low costs.

The variable selection process included variables comprehensively assessing functioning. Health condition (medical indication, comorbidities), personal factors (age, education level, gender, living with a partner, SF36 general health perception), body functions (SF36 scales mental health, vitality and pain), activities and participations (work force participation, SF36 scales physical functioning, role physical, role emotional and social functioning), and an environmental factor (type of rehabilitation care received) were considered. The correlation of each variable with costs was investigated in univariate analysis. Variables with a p-value lower than 0.25 were selected for further analysis. In a second step, a linear regression was performed in order to identify multicollinearity. A Variance Inflation Factor (VIF) higher than 2.5 was considered an indicator of multicollinearity. In order to guarantee the comparability of both regression models the evidence of a significant effect of an independent variable on costs either in the univariate GLM regression or in the univariate logistic regression was a criterion for including the variable in both regression models.

Statistical calculations were performed using the SPSS version 14.0 and the SAS version 9.1.

5.3. Results

Baseline characteristics of the 410 patients included in the study are described in Table 7.

Table 7 Baseline characteristics of the sample.
Values are n (percentages) or means (SD).

Variables (Baseline)	Osteoarthritis	Osteoporosis	Back Pain	Fibromyalgia	Total
N	97	98	143	72	410
Female (%)	66 (68)	83 (84.7)	97 (67.8)	72 (100)	318 (77.6)
Age (years) mean (SD)	66.56 (10.53)	66.85 (7.63)	52.91 (14.22)	53.49 (8.62)	59.57 (13.00)
Subjects living in partnership (%)	52 (53.6)	49 (50.0)	84 (58.7)	50 (69.4)	235 (57.3)
Subjects with high educational level (%)	36 (37.1)	34 (34.7)	70 (49.0)	10 (13.9)	150 (36.6)
Subjects with paid work (%)	15 (15.46)	8 (8.16)	68 (47.55)	35 (48.6)	126 (30.73)
Retired (%)	61 (62.9)	66 (67.3)	29 (20.3)	17 (23.6)	173 (42.2)
Comorbidity Score (SCQ[3]) mean (SD)	3.69 (2.43)	5.23 (2.94)	2.33 (2.74)	6.26 (3.52)	4.06 (3.23)
SF-36 Physical Score mean (SD)	31.97 (8.47)	37.19 (9.38)	34.86 (8.99)	30.40 (6.59)	33.96 (8.91)
SF-36 Mental Score mean (SD)	49.26 (10.42)	50.25 (9.58)	48.95 (10.69)	40.03 (12.28)	47.85 (11.18)

Complete direct medical cost data was available at baseline for 72.16% osteoarthritis, 72.45% osteoporosis, 72.73% back pain and 77.78% fibromyalgia patients. The data set was complete regarding sex, age, medical indication and treatment, but values were missing (percentage of missing values) considering educational level (7.6%), participation at the work force (6.1%), comorbidity score (7.3%) and the SF-36 scales (between 7.85% and 10.2%). Since subjects with complete data sets (N=275) did not statistically significantly differ from subjects without complete data sets (N=135) regarding age, sex, educational level, participation at the work force and the comorbidity score, missing values can be supposed to be missing completely at random. However, multiple imputation techniques could not be used adequately due to the absence of high correlated covariates. The bias introduced by inadequately imputing missing data was therefore considered to be worse than the loss of

[3] SCQ, Self-administered comorbidity questionnaire.

power introduced by restricting the analysis to those observations with complete data. Hence, solely the 275 subjects (67%) with complete data were considered in the regression analysis.

Direct medical costs and their components are displayed in Table 8. The univariate regression analyses are presented in Table 9. Neither the univariate GLM regression nor the univariate logistic regression showed any evidence that sex, marital status and treatment should be included in the final models.

Table 8 Cost components and annual direct medical costs before rehabilitation. Values are means [95% bias accelerated and corrected confidence intervals] calculated with 1000 bootstrap samples.
All values in Euros.

	Osteoarthritis (N=97)	Osteoporosis (N=98)	Back Pain (N=143)	Fibromyalgia (N=72)	Total (N=410)
Outpatient physician visits	356.77 [259.92; 458.94]	262.66 [185.88; 333.12]	547.35 [384.05; 727.65]	1438.83 [1065.44; 1846.27]	607.72 [499.16; 718.46]
Non physician services	170.71 [121.90; 226.78]	257.61 [160.20; 327.03]	243.23 [172.71; 305.86]	1814.25 [1449.82; 2269.28]	510.86 [409.66; 612,71]
Medication	699.34 [541.90; 867.21]	1262.61 [977.62; 1532.54]	525.19 [385.67; 652.49]	615.51 [463.68; 773.02]	761.87 [641.60; 857.07]
Inpatient treatment	175.36 [0.00; 355.48]	252.55 [0.00; 617.96]	591.00 [169.52; 1055.61]	636.96 [56.37; 1494.67]	411.76 [201.76; 648.71]
Median	**1105.84**	**1344.21**	**829.83**	**3501.15**	**1333.92**
Direct medical costs	**1510.85 [1178.57; 1905.19]**	**2023.85 [1484.73; 2583.72]**	**1963.00 [1341.32; 2548.28]**	**4663.04 [3444.27; 6015.10]**	**2377.86 [1995.54; 2783.43]**

The final multivariate GLM model and a logistic regression model including the same variables are presented in Table 10. In the final GLM regression model medical indication, age and the scales of the SF36 role physical, physical functioning, social functioning and vitality were statistically significant predictors of direct medical costs.

Table 9: Univariate regression analysis. A p-Value <0.25 was considered significant.

Variables		**Linear outcome**	**Dichotomized outcome** (≥€1333.00)
	Values of cut-offs	P-values	P-values
Demographics			
Sex	Women	NS	NS
Age	continuous	NS	0.032
Education	High educational level	0.13	NS
Work force participation	Employed	NS	0.020
Living with a partner	Living with a partner	NS	NS
Interventional variables			
Treatment (outpatient or day care)	Day care	NS	NS
Disease related variables			
Indication (Dummy)	Osteoarthritis	Referent	Referent
	Osteoporosis	0.1014	0.107
	Back pain	0.1092	0.811
	Fibromyalgia	< 0.001	0.000
Comorbidities	continuous	< 0.001	0.000
Quality of Life			
SF36- physical functioning	continuous	< 0.001	0.004
SF36- role physical	continuous	< 0.001	0.000
SF36- physical pain	continuous	< 0.001	0.001
SF36- general health perception	continuous	< 0.001	0.000
SF36- vitality	continuous	< 0.001	0.000
SF36- social functioning	continuous	< 0.001	0.000
SF36- role emotional	continuous	< 0.001	0.001
SF36- mental health	continuous	< 0.001	0.000

The explanatory power (Pseudo-R^2) of the final GLM model was estimated to be 32.87%. In the final logistic regression model the medical indication fibromyalgia (OR=5.74, 95%CI 2.051-16.066, p=0.001), the SF36 scale role physical (OR=0.988, 95%CI 0.980-0.996, p=0.002) and comorbidity (OR=1.161, 95%CI 1.043-1.292, p=0.006) were statistically significant determinants of high direct medical costs. The probability (estimated with ROC curves) that the final logistic model can correctly distinguish between low and high cost was estimated to be approximately 76.4%.

Table 10 Multivariate models for prediction of direct medical costs. The table shows the final model of a generalized linear regression (GLM) with log link function and gamma distribution as well as a multivariate logistic regression model estimated with the same variables. In the logistic regression direct medical costs were dichotomized at the median of €1333. The probability estimated with ROC curve that this logistic model can correctly distinguish between low and high cost was 76.4%.

	Linear outcome			**Dichotomized outcome**		
Variables in the final model	**ß**[4]	**SE**	**p-Value**	**Odds Ratio**	**95% Confidence Interval**	**p-Value**
Age	0.0125	0.0059	**0.0344**	1.031	1.003 – 1.060	**0.030**
Indication						
Osteoarthritis		Referent			Referent	
Osteoporosis	0.7265	0.1947	**0.0002**	1.412	0.590 – 3.377	0.439
Back pain	0.6247	0.1783	**0.0005**	1.962	0.864 - 4.453	0.107
Fibromyalgia	1.2775	0.2295	**< 0.0001**	6.208	2.060- 18.709	**0.001**
Comorbidities	0.0288	0.0229	0.2076	1.157	1.033 - 1.296	**0.012**
SF36- role physical	-0.0074	0.0022	**0.0006**	0.988	0.978 - 0.998	**0.014**
SF36- physical functioning	-0.0073	0.0035	**0.0365**	1.007	0.990 – 1.025	0.422
SF36- mental health	-0.0095	0.0050	0.0585	0.986	0.965 – 1.008	0.214
SF36- vitality	0.0137	0.0050	**0.0058**	1.013	0.990 – 1.037	0.266
SF-36 social functioning	-0.0071	0.0036	**0.0477**	0.990	0.975 – 1.005	0.181

[4] $e^{ß}$ = ratio of means, percentage increase in mean cost per unit increase in the covariate

5.4. Discussion

We found that age, medical condition, comorbidities and various aspects of functioning may explain direct medical costs. Our results are largely consistent with the determinants identified in previous studies examining the direct medical costs of single conditions. Additionally, our work is the first to show in a direct comparison the magnitude of the economic burden related to fibromyalgia.

An important aspect of our work was the examination of the determinants of high medical costs as defined beyond the median value €1333. Differing from the analysis of direct medical costs using linear regression modelling, we found that comorbidity seems to play an important role and may actually be more important than some additional aspects of physical functioning beyond role physical. This indicates that optimal medical management of comorbidities is a corner stone in reducing high direct medical costs in comprehensive rehabilitation programs.

When comparing our results with the literature it is important to keep in mind that we considered four musculoskeletal conditions while published studies looked for predictors of costs regarding a single condition. Results of previous studies are therefore not directly comparable with ours. Indeed, medical condition was one of the strongest predictors of direct medical costs in this work. This result is consistent with a similar study targeting determinants of overall costs (direct medical and indirect costs) across three musculoskeletal conditions, which found the medical condition to be the single predictor of costs [51]. In fact, only studies including many musculoskeletal disorders enable a direct and unbiased comparison of the economic burden of musculoskeletal diseases.

Predictors of direct costs identified in the present work are generally in line with available literature. We identified age as a statistically significant predictor of direct medical costs,

which did not achieve significance in the final model addressing direct medical costs beyond the median. Indeed, age was identified as a significant predictor of direct medical costs in patients with RA [60] but this variable was dominated by functional status and other determinants in studies addressing direct medical costs beyond the median [62, 64]. Associations between the scales of the SF 36 and direct medical costs are consistent with the available literature: poor scores in subscales of the SF 36 were significantly associated with the magnitude of direct costs incurred by OA patients [66] as well as with higher direct costs among RA patients [61]. Considering that the SF-36 is measuring similar constructs as the HAQ, WOMAC and FIQ [5, 83], our results are in line with studies addressing a single musculoskeletal condition, which found functional status, measured by disease-specific health related quality of life instruments, to be a reliable predictor of direct costs [5, 56-61, 63-65, 84].

The presence of comorbidity is an important predictor of costs among fibromyalgia patients [59, 63, 64]. However, the impact of comorbidity on direct costs is still unclear among other musculoskeletal conditions. In a study including over 7000 patients with RA comorbidity was, after the HAQ, the second strongest predictor of costs among clinical variables [60]. In contrast, among RA and OA patients, comorbidity did not remain in the final model explaining costs [61, 62, 66]. In two of these studies SF-36 scales were identified as strong predictors of direct costs [62, 66], which comes close to our results. The SF-36 scales are powerful determinants of direct costs and might have dominated comorbidity in explaining the magnitude of costs in our work. Comorbidity was in contrast, statistically a highly significant predictor of direct medical costs beyond the median in the present study. Since literature addressing the impact of comorbidity on direct medical costs beyond the median is scarce and contradictory, our results are hardly comparable. Among RA patients stratified by disease duration, comorbidity did not remain in the final model while functional disability (HAQ) was the strongest variable associated with direct costs beyond the median [62]. On

the contrary, the presence of many comorbidity conditions was strongly associated with costs beyond the median among women with fibromyalgia [64].

Our results raise the question of what to target when designing cost-saving rehabilitation programs. In order to reduce high direct medical costs in the long term, rehabilitation programs need to focus rather on the societal perspective of functioning represented by the involvement in life situations like daily routine, instead of focusing on the individual perspective of functioning represented by the execution of a task or action by an individual. Additionally, adequate disease management programs for patients with comorbidities need to be assured since the presence of coexisting conditions were shown to exert a powerful influence on the incurrence of direct medical costs beyond the median. Finally, as the medical indication fibromyalgia was the outstanding determinant of direct medical costs beyond the median in our population, fibromyalgia should be targeted as a major public health issue.

This work has some limitations. Firstly, we used a self-report retrospective standardized questionnaire to collect information on health care resources and this kind of data source is susceptible to recall bias. Secondly, we extrapolated a part of the costs to obtain one year figures conservatively assuming that resource use increases constantly. Thirdly, we decided to perform regression analysis only with complete data sets. However, the bias introduced by inadequately imputing missing data was considered to be worse than the loss of power introduced by restricting the analysis to those observations with complete data. Fourthly, regarding the comparison between high and low costs it would also be meaningful to compare the first quarter of the distribution of direct medical costs with the last quarter but this was not possible due to our sample size. Finally, it is also important to notice that the loss of power due to dichotomization of our dependent variable could be one reason the

scales of the SF36 physical functioning, social functioning and vitality did not remain in the final logistic regression model.

In summary, in our population almost the whole spectrum of functioning including body functions (SF36 scale vitality) as well as activities and participation (SF36 scales physical functioning, role physical and social functioning) in relation to the health condition (medical indication) and a personal factor (age) is needed to explain the distribution of direct medical costs. In predicting direct costs beyond the median, health condition (fibromyalgia, comorbidity) and an important participation component regarding how patients function in their daily activities as a result of physical health (SF 36 role physical), remained strong predictors.

6. Conclusion

In this doctoral thesis an instrument to collect health resource utilization has been described and major direct medical cost categories, as well as determinants of direct medical costs for our sample including osteoarthritis, osteoporosis, back pain and fibromyalgia patients, have been identified.

Due to the limitability of health resources and permanently rising health care costs related to musculoskeletal diseases, health care and pension fund insurances are increasingly interested in alongside economic evaluations of new interventions in the field of rehabilitation. However, clinical researchers are often overstretched by the need to perform an alongside economic evaluation because firstly, there are almost no questionnaires available for the collection of routine health care resource use data; secondly, major direct medical cost categories capable of performing pre-post or between-group comparisons alongside clinical studies are not clearly defined, and thirdly, what to target in a rehabilitation program, in order to avoid the incurrence of excessive and avoidable costs after discharge, is also often not clearly defined.

In the first part of this doctoral thesis we describe an instrument to collect health resource utilization. The instrument proved to be satisfactory and provided enough information to calculate direct medical, direct non medical and indirect costs. A core version of this instrument omitting disease-specific aspects could serve as a starting point towards a standardized and validated, general, self-administered questionnaire suitable for economic evaluations in rehabilitation.

In the second part of this doctoral thesis we identified medication, physician visits, non-physician service and inpatient treatment as major direct medical cost categories for our sample, including osteoarthritis, osteoporosis, back pain and fibromyalgia patients. The

development of a standard brief core set of major direct medical cost categories for musculoskeletal conditions is important regarding the standardization and comparability of comparative economic evaluations. The major cost categories we identified can serve as candidate categories and enhance the process towards a standard brief core set of major cost categories for musculoskeletal conditions. This should be included in the alongside economic evaluation of rehabilitative interventions targeting pre-post or between-group comparisons.

In the last part of this doctoral thesis we showed that in our population almost the whole spectrum of functioning is needed to explain the distribution of direct medical costs. In predicting high direct costs beyond the median, health condition (fibromyalgia, comorbidity) as well as an important participation component regarding how patients function in their daily activities as a result of physical health (SF 36 role physical) remained strong predictors. Owing to our results and in order to reduce high direct medical costs in the long term, rehabilitation programs need to focus on the societal perspective of functioning represented by involvement in life situations like daily routine instead of focusing on the individual perspective of functioning represented by the execution of a task or action by an individual. Additionally, adequate disease management programs for patients with comorbidities need to be assured since the presence of coexisting conditions showed to exert a powerful influence on the incurrence of direct medical costs beyond the median. Finally, as the medical indication fibromyalgia was the outstanding determinant of direct medical costs beyond the median in our population, fibromyalgia should be targeted as a major public health issue.

Summary

Background

Musculoskeletal disorders affect hundreds of millions of people around the world and are related to important limitations in functioning. The economic burden related to medical treatment of subjects with musculoskeletal chronic diseases is therefore substantial. Rehabilitation of patients suffering from osteoarthritis, osteoporosis, back pain or fibromyalgia is essential and achieves its goal by supporting patients in achieving and maintaining an optimal level of functioning. Due to the economic burden related to these diseases and the limitations of health resources, an additional task of rehabilitative interventions is the reduction of excessive direct costs related to inappropriate disease management. When designing studies targeting the effectiveness of rehabilitation programs for musculoskeletal patients it is therefore essential to provide conditions necessary to perform sound economic evaluations targeting also the cost-effectiveness of such interventions.

In order to provide conditions necessary to perform economic evaluations alongside studies targeting the effectiveness of rehabilitation programs, it is essential to define how health care resource utilization should be measured. It is also crucial to identify which health resource utilization domains are relevant and sufficient to estimate reliable figures of costs in order to perform pre-post or between-group cost analyses. Finally, when designing rehabilitation programs for musculoskeletal patients targeting not only an optimal level of functioning but also the reduction of excessive and avoidable costs related to medical treatment, it is important to consider which factors are determining such costs in order to define what to target.

Objectives

The overall objective of this doctoral thesis is to address some of the conditions necessary to routinely perform alongside economic evaluations of rehabilitation programs. The specific aims are to 1) present a standardized instrument to collect data about health care resource use, 2) identify major cost categories of direct medical costs to be used in comparative economic evaluations of subjects with musculoskeletal diseases and 3) identify determinants of direct medical costs among subjects with musculoskeletal diseases. This thesis is therefore subdivided into three parts. In the first part the development of a standardized instrument to collect health care resource use in the context of rehabilitation is described and lessons learned are discussed. In the next part major direct medical costs categories among patients with musculoskeletal conditions undergoing outpatient rehabilitation are identified. Lastly, the determinants of the direct medical costs as well as direct medical costs beyond the median incurred by chronic musculoskeletal patients are examined. Each of these parts contain a specific discussion section referring to its specific results.

"Development of an instrument to collect health care resource use data in the context of rehabilitation"

The objective of this part of the doctoral thesis is to describe the development of an instrument to collect health resource utilization data in rehabilitation research and to discuss lessons learned. The questionnaire was developed to collect data about health resource use aiming at the alongside economic evaluations of five rehabilitation studies. Considering the health condition of study patients, the specific questions of associated studies and the methodological standards proposed by the "Working Group Methods in Health Economic Evaluation" (MEA), it was decided which health resource use components should be part of the questionnaire and which recall period would be adequate. Health resource use information was assessed in order to calculate direct medical, direct non medical and indirect costs. The standardized self administered retrospective health resource

use assessment questionnaire was answered by a total of 1042 subjects with one of the following indications: osteoarthritis, osteoporosis, back pain, cancer, fibromyalgia or brain/cranial traumata. Although the questionnaire was adapted for each rehabilitation study, it could be learned that the development of a standardized general brief questionnaire to collect health resource use with fixed cost categories is of fundamental importance in order to facilitate comparability across indications and studies in rehabilitation. The instrument to collect health resource utilization provided enough information to calculate direct medical, direct non medical and indirect costs. The core version omitting disease-specific aspects could serve as a starting point towards a standardized and validated, general, self-administered questionnaire suitable for alongside comparative economic evaluations in rehabilitation.

"Identification of major direct medical cost categories among patients with musculoskeletal conditions undergoing outpatient rehabilitation"

In economic evaluations brief core sets of most relevant cost domains, including as many categories as necessary and as few as possible, are recommended, alongside cohort studies, which target either pre-post or between-group cost comparisons. The goal of this part of the doctoral thesis was to identify major cost categories of direct medical costs among patients with musculoskeletal conditions undergoing a rehabilitation program. Minor cost categories were discriminated from major cost categories by ranking the percentage of direct medical costs represented by each category using a cut off of 5%. Means and 95% confidence intervals [95% CI] of direct medical costs were estimated either with major and minor or solely with major cost categories using 1000 bootstrap samples. Major cost categories for our sample including osteoarthritis, osteoporosis, back pain and fibromyalgia patients were outpatient physician visits, non physician services, medication and inpatient treatment. Since the 95% confidence intervals of estimated means were overlapping, no statistically significant difference can

be assumed between the mean direct medical costs estimated solely with major categories and the one estimated with all available categories The development of a standard brief core set of major direct medical cost categories for musculoskeletal conditions is important regarding the standardization of comparative economic evaluations. The major cost categories we identified can serve as candidate categories and make a valuable contribution to the establishment of a standard brief core set of major cost categories for musculoskeletal conditions which should be included in the alongside economic evaluation of rehabilitative interventions.

"Determinants of major direct medical cost categories among patients with osteoporosis, osteoarthritis, back pain and fibromyalgia undergoing outpatient rehabilitation"

The goal of this part of this doctoral thesis was to identify determinants of direct medical costs among patients with osteoporosis, osteoarthritis, back pain or fibromyalgia patients undergoing outpatient rehabilitation. The sample consisted of 410 patients. In order to identify determinants of direct medical costs a generalized linear model (GLM) with log link function and gamma distribution as well as a multivariate logistic regression analysis were performed. A total of 275 (67%) subjects with complete data sets were considered in the regression analysis. In the final GLM regression model medical indication, age and the scales of the SF36 role physical, physical functioning, social functioning and vitality were significant predictors of direct medical costs. In the final logistic regression model medical indication, the SF36 scale role physical and comorbidity were significant determinants of high direct medical costs beyond the median. This work confirms known predictors of the distribution of direct medical costs and broadens the understanding of determinants of direct medical costs beyond the median. The need to comprehensively address patient problems, including optimal medical management of comorbidities as well as the need to focus on the societal perspective of functioning, are core issues in designing cost-saving rehabilitation

programs. Additionally, the medical indication fibromyalgia, which was the outstanding determinant of high direct medical costs in our population, should be targeted as a major public health issue.

Conclusion

In the first part of this doctoral thesis we proposed an instrument to collect health resource utilization. The instrument was answered satisfactorily and provided enough information to calculate direct medical, direct non medical and indirect costs. A core version of this instrument omitting disease-specific aspects could serve as a starting point towards a standardized and validated general self-administered questionnaire suitable for economic evaluations in rehabilitation.

In the second part of this doctoral thesis we identified medication, physician visits, non physician services use and inpatient treatment as major direct medical cost categories for our sample including osteoarthritis, osteoporosis, back pain and fibromyalgia patients. The major cost categories we identified can serve as candidate categories and contribute to enhance the process towards a standard brief core set of major cost categories for musculoskeletal conditions, which should be included in the economic evaluation of rehabilitative interventions targeting pre-post or between-group comparisons.

In the last part of this doctoral thesis we showed that, in our population, almost the whole spectrum of functioning is needed to explain the distribution of direct medical costs. In predicting high direct costs beyond the median health condition (fibromyalgia, comorbidity) as well as an important participation component regarding how patients function in their daily activities as a result of physical health (SF 36 role physical) remained strong predictors. Owing to our results and in order to reduce high direct medical costs in the long run, rehabilitation programs need to focus rather on the societal perspective of functioning represented by the involvement in life situations like daily routine, instead of focusing on the

individual perspective of functioning represented by the execution of a task or action by an individual. Additionally, since the presence of coexisting conditions showed to exert a powerful influence on the incurrence of direct medical costs beyond the median, appropriate disease management programs for patients with comorbidities need to be assured. Finally, as the medical indication fibromyalgia was the outstanding determinant of direct medical costs beyond the median in our population, fibromyalgia should be targeted as a major public health issue.

7. Zusammenfassung

Hintergrund

Millionen von Menschen in der ganzen Welt leiden unter einer oder mehreren muskuloskeletalen Erkrankungen und erleben deswegen erhebliche Beeinträchtigungen in ihrer Funktionsfähigkeit. Die sozialökonomischen Konsequenzen, welche mit der medizinischen Behandlung von muskuloskeletalen Erkrankungen zusammenhängen, sind daher beträchtlich. Die Rehabilitation von Menschen mit Erkrankungen wie zum Beispiel Osteoarthrose, Osteoporose, Rückenschmerzen und Fibromyalgia ist daher von großer Bedeutung.

Ziel der Rehabilitation ist es, Betroffene zu unterstützen, ein optimales Niveau der Funktionsfähigkeit zu erreichen und dieses aufrecht zu erhalten. Aufgrund der sozialökonomischen Konsequenzen verbunden mit der Erkrankung und der Knappheit von Ressourcen im Gesundheitswesen, ist ein weiteres Ziel der Rehabilitation die Reduktion von exzessiven direkten medizinischen Kosten. Diese Kosten sind meistens auf ineffiziente Behandlungsstrategien zurückzuführen. Es ist deshalb bedeutsam, das Ziel „*Reduktion von exzessiven direkten medizinischen Kosten*" schon bei der Entwicklung von neuen Rehabilitationsprogrammen zu berücksichtigen und die Voraussetzungen für die Durchführung von begleitenden ökonomischen Evaluationen, meistens Kosten-Wirksamkeits-Analysen, schon bei der Planung von klinischen Studien zu schaffen.

Um begleitende ökonomische Evaluationen klinischer Studien im Bereich der Rehabilitation zu ermöglichen, ist es sehr wichtig zu definieren, wie Ressourcenverbrauchsdaten erhoben werden sollen. Es ist ebenfalls wichtig zu definieren, welche Kostenkomponenten relevant und ausreichend für die Durchführung von vergleichenden gesundheitsökonomischen Analysen sind. Ebenfalls sollen bei der Entwicklung von Rehabilitationsprogrammen, welche nicht nur eine optimale Funktionsfähigkeit, sondern auch eine Reduktion von

exzessiven und vermeidbaren direkten Kosten anstreben, Determinanten von solchen Kosten berücksichtigt werden.

Ziele

Das allgemeine Ziel dieser Doktorarbeit ist es, einigen der notwendigen Voraussetzungen für die routinemäßige Durchführung von begleitenden gesundheitsökonomischen Evaluationen zu untersuchen. Die spezifischen Ziele sind 1) ein Instrument zur Erfassung von Ressourcenverbrauch zu präsentieren sowie 2) die für vergleichende ökonomische Evaluationen bedeutenden direkten medizinischen Kostenkategorien in einer Patientengruppe mit muskuloskeletalen Erkrankungen und 3) Determinanten von direkten medizinischen Kosten in einer Patientengruppe mit muskuloskeletalen Erkrankungen zu identifizieren.

Diese Doktorarbeit wurde wegen der spezifischen Ziele in drei Teilen strukturiert. Im ersten Teil wird die Entwicklung eines Instrumentes zur Erhebung von Ressourcenverbrauch dargestellt und die damit verbundenen Erfahrungen und Erkenntnisse werden diskutiert. Im zweiten Teil werden bedeutende direkte medizinische Kostenkategorien, welche in begleitenden und vergleichenden gesundheitsökonomischen Evaluationen von Interventionen für Patienten mit muskuloskeletalen Erkrankungen herangezogen werden sollen, identifiziert. Zum Schluss werden Determinanten von direkten medizinischen Kosten aber auch von direkten medizinischen Kosten jenseits des Median identifiziert. Jeder Teil dieser Doktorarbeit beinhaltet eine eigene Diskussion, die zu der spezifischen Ergebnissen gehört.

"Entwicklung eines Instrumentes zur Erfassung von Ressourcenverbrauch in der Rehabilitation"

Ziel dieses Teils der Doktorarbeit ist die Beschreibung der Entwicklung eines Instrumentes zur Erhebung des Ressourcenverbrauchs in der Rehabilitation sowie die Diskussion unserer

Erfahrungen und Erkenntnisse. Ziel der Entwicklung des Instruments war die Erhebung des Ressourcenverbrauchs mehrerer Rehabilitationsstudien, wofür eine begleitende gesundheitsökonomische Evaluation vorgesehen war. Die Entscheidung, welche Kostenkomponenten erfasst werden sollen und welcher Detaillierungsgrad bevorzugt werden sollte, wurde anhand der Indikation, der spezifischen Fragestellung der Studie sowie der methodologischen Empfehlungen der „Arbeitsgruppe Methoden der gesundheitsökonomischen Evaluation“ (MEA) entschieden. Der Ressourcenverbrauch wurde mit dem Ziel erhoben, direkte medizinische und nicht medizinische sowie indirekte Kosten berechnen zu können. Das Instrument zur Erfassung des Ressourcenverbrauchs wurde von insgesamt 1042 Patienten, die entweder an Osteoarthritis, Osteoporose, Rückenschmerzen, Krebs, Fibromyalgia oder Schädel-Hirntrauma erkrankt waren, ausgefüllt. Obwohl das Instrument für jede Studie angepasst wurde, sind wir der Meinung, dass die Entwicklung eines kurzen, standardisierten und generellen Instruments zur Erfassung des Ressourcenverbrauchs in der Rehabilitation von großer Bedeutung bezüglich der Vergleichbarkeit zwischen Studien und Indikationen sein könnte. Ausreichende Daten zur Berechnung von direkten und indirekten Kosten konnten mit dem Instrument zur Erfassung des Ressourcenverbrauchs gewonnen werden.

„Identifikation von primär bedeutenden direkten medizinischen Kostenkategorien bei Patienten mit muskuloskeletalen Erkrankungen“

Ziel des zweiten Teils der Doktorarbeit ist es, primär bedeutende direkte medizinische Kostenkategorien in einer Population mit muskuloskeletalen Erkrankungen, welche sich am Anfang eines ambulanten Rehabilitationsprogramms (Tagesklinik) befindet, zu identifizieren. Der Bedeutungsgrad von Kostenkategorien wurde ermittelt, indem der Prozentanteil jeder Kostenkategorie in der Berechnung der direkten medizinischen Kosten ermittelt wurde. Eine Grenze von 5% sollte sekundäre von primären

Kostenkategorien unterscheiden. Mittelwerte und 95% Konfidenzintervalle [95% KI] der direkten medizinischen Kosten mit allen Kostenkategorien oder nur mit primär bedeutenden Kostenkategorien wurden mittels Bootstraping mit 1000 Replikationen geschätzt. Primär bedeutende Kostenkategorien in unserer Studienpopulation mit entweder Osteoporose, Osteoarthritis, Rückenschmerzen oder Fibromyalgia waren ambulante Arztkonsultationen, therapeutische Leistungen, Medikation und stationäre Behandlung im Krankenhaus. Die Mittelwerte [95% KI] berechnet mit und ohne sekundär bedeutenden Kostenkategorien waren sehr ähnlich. Die primären Kostenkategorien, welche in dieser Arbeit identifiziert wurden, können als Kandidatenkategorien eines standardisierten summarischen „Core Set" primär bedeutender direkter medizinischer Kostenkategorien dienen, welche in vergleichenden gesundheitsökonomischen Analysen verwendet werden können.

"Determinanten primär bedeutender direkt medizinischer Kostenkategorien in einer Patientenpopulation mit Osteoporose, Osteoarthrose, Rückenschmerzen oder Fibromyalgia"

Ziel dieses Teils der Doktorarbeit ist es, Determinanten von primären direkt medizinischen Kostenkategorien in einer Patientenpopulation mit Osteoporose, Osteoarthrose, Rückenschmerzen oder Fibromyalgia, welche in einer ambulanten Rehabilitation behandelt wurden, zu identifizieren. Insgesamt wurden 410 Patienten eingeschlossen. Um Determinanten direkter medizinischer Kosten zu identifizieren, wurden ein generalisiertes lineares Modell (GLM) mit log link Funktion und Gamma Verteilung sowie eine logistische Regression durchgeführt. Insgesamt wurden 275 (67%) Patienten in den Regressionsanalysen berücksichtigt. Im Endmodell des GLM wurden Indikation, Alter und die SF-36 Skalen körperliche Rollenfunktion, physische Funktion, soziale Funktion und Vitalität als signifikante Determinanten der Verteilung direkter medizinischer Kosten identifiziert. Im Endmodell der logistischen Regression wurden Indikation, die Skala

körperliche Rollenfunktion des SF-36 sowie Komorbidität als Determinanten von hohen direkten medizinischen Kosten jenseits des Median identifiziert. Diese Arbeit bestätigt bekannte Determinanten von direkten medizinischen Kosten und untermauert die Notwendigkeit einer umfassenden Behandlungsstrategie in der Rehabilitation. Optimales medizinisches Management von Komorbiditäten sowie Rehabilitationsprogramme, die hauptsächlich auf die soziale Perspektive der Funktionsfähigkeit abzielen, sind erforderlich, um exzessiven direkten medizinischen Kosten entgegenzuwirken. Die Indikation Fibromyalgia, die eine bedeutende Determinante von erhöhten direkten medizinischen Kosten in unserer Population war, sollte als ein wichtiges Thema öffentlicher Gesundheit behandelt werden.

Schlußfolgerung

Im ersten Teil dieser Doktorarbeit wurde ein Instrument zur Erhebung von Ressourcenverbrauch dargestellt. Das Instrument wurde gut akzeptiert und lieferte ausreichend Information, um direkte medizinische, direkte nicht medizinische und indirekte Kosten zu berechnen. Eine reduzierte Version dieses Instrumentes ohne krankheitsspezifische Aspekte könnte als Startpunkt der Entwicklung eines standardisierten und validierten nicht krankheitsspezifischen Instruments für die Erfassung von Ressourcenverbrauch in gesundheitsökonomische Evaluationen in der Rehabilitation dienen.

Im zweiten Teil dieser Dissertation werden ambulante Arztkonsultationen, therapeutische Leistungen, Medikation und stationäre Behandlung im Krankenhaus als primär bedeutende direkte medizinische Kostenkategorien in einer Patientenpopulation mit Osteoporose, Osteoarthrose, Rückenschmerzen oder Fibromyalgia identifiziert. Diese Kostenkategorien können als Startpunkt dienen, um ein standardisiertes summarisches „Core Set" primär bedeutender direkter medizinischer Kostenkategorien zu entwickeln, welches in begleitenden und vergleichenden gesundheitsökonomischen Analysen verwendet werden kann.

Im letzten Teil dieser Dissertation, Alter und die SF-36 Skalen körperliche Rollenfunktion, körperliche Funktion, sozialer Funktion und Vitalität wurden als signifikante Determinanten der Verteilung direkter medizinischer Kosten identifiziert während Indikation, die Skala körperliche Rollenfunktion des SF-36 sowie Komorbidität als Determinanten von erhöhten direkten medizinischen Kosten jenseits des Median identifiziert wurden. Um positive sozioökonomische Outcomes zu erreichen, müssen Behandlungsstrategien in der Rehabilitation umfassend sein. Die soziale Perspektive der Funktionsfähigkeit oder Teilhabe sollte mehr Gewicht bekommen als die individuelle Perspektive der Funktionsfähigkeit. Ein optimales medizinischen Management von

Komorbiditäten ist ebenfalls erforderlich, um exzessiven direkten medizinischen Kosten entgegenzuwirken. Schließlich, die Indikation Fibromyalgia, die eine bedeutende Determinante von erhöhten direkten medizinischen Kosten in unserer Population war, sollte als ein bedeutungsvolles Thema öffentlicher Gesundheit behandelt werden.

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9. Appendix

Fragebogen zur Erfassung von Ressourcenverbrauch

Study: Feasibility of the Willingness-to-pay methodology for expected and perceived health effects
Health condition: Osteoporosis, Osteoarthritis, Back pain

Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Ludwig Maximilians Universität München

Fragebogen zur Erfassung von Ressourcenverbrauch 12 Monate vor der Rehabilitation

1. Waren Sie **innerhalb der letzten 4 Wochen beim** Arzt (Praxis) wegen Ihrer Erkrankung?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an bei welchem:

	Fachrichtung	**Wie oft?**
☐	Hausarzt/Allgemeinarzt	Mal
☐	Internist	Mal
☐	Neurologe	Mal
☐	Orthopäde	Mal
☐	Facharzt für : _____	Mal

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Arztbesuche benutzt?		**Kosten der Fahrten <u>insgesamt</u>, falls bekannt**
☐ Öffentliche Verkehrsmittel ☐ Krankenwagen ☐ Sonstiges:	☐ Taxi ☐ Privat Pkw	Euro

2. Sind Sie **in den letzten 12 Monaten** im Krankenhaus **in einer Tagesklinik** wegen Ihrer Erkrankung behandelt worden?

☐ **Nein** ☐ **Ja**. Wenn ja:

In welcher Klinik?	**Fachabteilung**	**Wegen**	**Wie lange?**
			Tage
			Tage

Vorlage KUM/OC – fe (00-03-13)

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Tagesklinikbehandlung benutzt?		**Kosten der Fahrten insgesamt, falls bekannt**
☐ Öffentliche Verkehrsmittel ☐ Krankenwagen ☐ Sonstiges:	☐ Taxi ☐ Privat Pkw	Euro

3. Sind Sie **in den letzten 12 Monaten** im Krankenhaus **stationär** wegen Ihrer Erkrankung behandelt worden?

☐ **Nein** ☐ **Ja**. Wenn ja:

In welchem Krankenhaus?	**Fachabteilung**	**Wegen**	**Wie lange?**
			Tage
			Tage

4. Sind Sie **in den letzten 12 Monaten** im Krankenhaus **ambulant** ärztlich wegen Ihrer Erkrankung behandelt worden?

☐ **Nein** ☐ **Ja**. Wenn ja:

In welcher Klinik?	**Fachabteilung**	**Wegen**	**Wie lang?**
			Tage
			Tage
Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer ambulanten Behandlung benutzt?		**Kosten insgesamt, falls bekannt**	
☐ Öffentliche Verkehrsmittel ☐ Krankenwagen ☐ Sonstiges:	☐ Taxi ☐ Privat Pkw	Euro	

5. Haben Sie **in den letzten 12 Monaten** wegen Ihrer Erkrankung an einer Selbsthilfegruppe teilgenommen?

☐ **Nein** ☐ **Ja**: Wie oft im Monat? _____ Mal. Wie lange? _____ Monate.

6. Haben Sie **in den letzten 6 Monaten** einen **Notdienst** aufgrund Ihrer Erkrankung in Anspruch genommen?

☐ **Nein**, ich habe keinen Notdienst in Anspruch genommen

☐ **Ja**, ich wurde im Krankenhaus in einer Notfallambulanz behandelt. Wie oft? _____

☐ **Ja**, ich habe einen Bereitschaftsarzt zu Hause benötigt. Wie oft? _____

☐ **Ja**, ich habe einen Krankenwagen nur mit Sanitätern benötigt. Wie oft? _____

☐ **Ja**, ich habe einen Krankenwagen mit Sanitätern und Notarzt benötigt. Wie oft? _____

7. Haben Sie **in den letzten 12 Monaten** ambulante therapeutische Leistungen wegen Ihrer Erkrankung in Anspruch genommen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Art der Therapie	**Wie oft?**
☐	Krankengymnastik (Physiotherapie) Therapiebezeichnung:	Mal
☐	Massage Therapiebezeichnung:	Mal
☐	Ergotherapie	Mal
☐	Psychologische Behandlung	Mal
☐	Anwendungen vom Heilpraktiker	Mal
☐	Sonstiges	Mal
☐	Sonstiges	Mal
☐	Sonstiges	Mal

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Therapie benutzt?		**Kosten der Fahrten <u>insgesamt</u>, falls bekannt**
☐ Öffentliche Verkehrsmittel	☐ Taxi	Euro
☐ Krankenwagen	☐ Privat Pkw	
☐ Sonstiges:		

8. Haben Sie **in den letzten 6 Monaten** eine Hilfsmittelversorgung (z. B. Gehhilfe, Rollstuhl, Schienen, Bandagen, Einlagen) wegen Ihrer Erkrankung in Anspruch genommen?

☐ **Nein** ☐ **Ja**. Wenn ja:

Welche Hilfsmittel?	**Kosten <u>insgesamt</u>, falls bekannt**	**Mussten Sie etwas bezahlen?**
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten

9. Besitzen Sie einen **Schwerbehindertenausweis**?

☐ **Nein** ☐ **Ja** mit Behinderungsgrad: _____% Welches Merkzeichen?_____

10. Haben Sie **innerhalb der letzten 4 Wochen** Medikamente eingenommen? Falls ja, legen Sie bitte einen Teil der Medikamentenverpackung bei, aus dem der Name des Medikamentes ersichtlich ist.
☐ **Nein** ☐ **Ja**. Wenn ja:

<u>Ärztlich verschriebene Medikamente</u> **Name**	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			
4.			
5.			
<u>Selbstgekaufte Medikamente (ohne Verschreibung)</u> **Name**	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			

11. Sind Sie von Zuzahlungen befreit? ☐ **Nein** ☐ **Ja**

12. Wenn Sie an Ihre Erkrankung denken: Haben Ihnen Angehörige oder Freunde/Bekannte **in den letzten 4 Wochen** geholfen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an wobei:

	Verrichtungen	**Wie viele Stunden pro Woche?**	***Was wurde gemacht?***
☐	Bei pflegerischen Leistungen		
☐	Bei Arztbesuchen/ Therapien		
☐	Bei der Besorgung von Medikamente		
☐	Hilfe im Haushalt		
☐	Sonstiges: _____		

13. Haben Sie **in den letzten 12 Monaten** einen Rentenantrag gestellt?

☐ **Nein**, ich bin schon Rentner

☐ **Nein**, ich habe keinen Antrag gestellt

☐ **Ja**, der Antrag wurde aber noch nicht bewilligt

☐ **Ja**, ich wurde berentet am _____ Art der Rente?_____

Wenn Sie erwerbstätig sind: Bitte beantworten Sie noch Frage 14 und 15.

Wenn Sie nicht erwerbstätig sind: Der Fragebogen ist hier beendet.
Vielen Dank für Ihre Mitarbeit!

14. Konnten Sie wegen Ihrer Erkrankung **in den letzten 12 Monaten** nicht arbeiten?

☐ **Nein** ☐ **Ja**. Falls ja, waren Sie:

	Zustand	**Wie lange?**
☐	Krankgeschrieben **mit ärztlichem Attest**	**Tage**
☐	Krank, aber **ohne ärztliches Attest**	**Tage**
☐	Von der Arbeit **abwesend** (z. B. wegen Arztbesuche oder Krankengymnastik)	**Stunden**

15. Haben Sie **in den letzten 12 Monaten** wegen Ihrer Erkrankung an einer der folgenden beruflichen Maßnahmen teilgenommen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie an welche:

	Maßnahme	**Wie lange?**	***Wer hat die Maßnahme finanziert?***
☐	Umschulung	Wochen	☐ Arbeitsamt ☐ Arbeitgeber ☐ Selbst ☐ Sonstige: _____
☐	berufliche Fördermaßnahme	Wochen	
☐	Weiterbildung	Wochen	
☐	Sonstiges:	Wochen	

Vielen Dank für Ihre Mitarbeit!

Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Ludwig Maximilians Universität München

Fragebogen zur Erfassung von Ressourcenverbrauch
6 Monate nach der Rehabilitation

1. Waren Sie **innerhalb der letzten 4 Wochen** beim Arzt (Praxis) wegen Ihrer Erkrankung?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an bei welchem:

	Fachrichtung	**Wie oft?**
☐	Hausarzt/Allgemeinarzt	Mal
☐	Internist	Mal
☐	Neurologe	Mal
☐	Orthopäde	Mal
☐	Facharzt für : _____	Mal
Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Arztbesuche benutzt?		**Kosten der Fahrten insgesamt, falls bekannt**
☐ Öffentliche Verkehrsmittel ☐ Taxi ☐ Krankenwagen ☐ Privat Pkw ☐ Sonstiges:		Euro

2. Sind Sie **seit Ihrer Rehabilitation** im Krankenhaus **in einer Tagesklinik** wegen Ihrer Erkrankung behandelt worden?

☐ **Nein** ☐ **Ja**. Wenn ja:

In welcher Klinik?	**Fachabteilung**	**Wegen**	**Wie lange?**
			Tage
			Tage

Vorlage KUM/OC – fe (00-03-13)

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Tagesklinikbehandlung benutzt?		Kosten der Fahrten insgesamt, falls bekannt
☐ Öffentliche Verkehrsmittel ☐ Krankenwagen ☐ Sonstiges:	☐ Taxi ☐ Privat Pkw	Euro

3. Sind Sie **in den letzten 6 Monaten** im Krankenhaus **stationär** wegen Ihrer Erkrankung behandelt worden?

☐ **Nein** ☐ **Ja**. Wenn ja:

In welchem Krankenhaus?	Fachabteilung	Wegen	Wie lange?
			Tage
			Tage

4. Sind Sie **seit Ihrer Rehabilitation** im Krankenhaus **ambulant** ärztlich wegen Ihrer Erkrankung behandelt worden?

☐ **Nein** ☐ **Ja**. Wenn ja:

In welcher Klinik?	Fachabteilung	Wegen	Wie lang?
			Tage
			Tage

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer ambulanten Behandlung benutzt?		Kosten insgesamt, falls bekannt
☐ Öffentliche Verkehrsmittel ☐ Krankenwagen ☐ Sonstiges:	☐ Taxi ☐ Privat Pkw	Euro

5. Haben Sie **in den letzten 6 Monaten** wegen Ihrer Erkrankung an einer **Selbsthilfegruppe** teilgenommen?

☐ **Nein** ☐ **Ja**: Wie oft im Monat? _____. Wie lange? _____ Monate.

6. Haben Sie **in den letzten 6 Monaten** einen **Notdienst** aufgrund Ihrer Erkrankung in Anspruch genommen?

☐ **Nein**, ich habe keinen Notdienst in Anspruch genommen

☐ **Ja**, ich wurde im Krankenhaus in einer Notfallambulanz behandelt. Wie oft? _____

☐ **Ja**, ich habe einen Bereitschaftsarzt zu Hause benötigt. Wie oft? _____

☐ **Ja**, ich habe einen Krankenwagen nur mit Sanitätern benötigt. Wie oft? _____

☐ **Ja**, ich habe einen Krankenwagen mit Sanitätern und Notarzt benötigt. Wie oft? _____

7. Haben Sie in den letzten 6 Monaten ambulante therapeutische Leistungen wegen Ihrer Erkrankung in Anspruch genommen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Art der Therapie	**Wie oft?**
☐	Krankengymnastik (Physiotherapie) Therapiebezeichnung:	Mal
☐	Massage Therapiebezeichnung:	Mal
☐	Ergotherapie	Mal
☐	Psychologische Behandlung	Mal
☐	Anwendungen vom Heilpraktiker	Mal
☐	Sonstiges	Mal
☐	Sonstiges	Mal
☐	Sonstiges	Mal

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Therapie benutzt?		**Kosten der Fahrten insgesamt, falls bekannt**
☐ Öffentliche Verkehrsmittel	☐ Taxi	Euro
☐ Krankenwagen	☐ Privat Pkw	
☐ Sonstiges:		

8. Haben Sie **in den letzten 6 Monaten** eine Hilfsmittelversorgung (z. B. Gehhilfe, Rollstuhl, Schienen, Bandagen, Einlagen) wegen Ihrer Erkrankung in Anspruch genommen?
☐ **Nein** ☐ **Ja**. Wenn ja:

Welche Hilfsmittel?	**Kosten insgesamt, falls bekannt**	**Mussten Sie etwas bezahlen?**
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten

9. Besitzen Sie einen **Schwerbehindertenausweis**?

☐ **Nein** ☐ **Ja** mit Behinderungsgrad: _____% Welches Merkzeichen?_____

10. Haben Sie **innerhalb der letzten 4 Wochen** Medikamente eingenommen?
Falls ja, legen Sie bitte einen Teil der Medikamentenverpackung bei, aus dem der Name des Medikamentes ersichtlich ist.
☐ **Nein** ☐ **Ja**. Wenn ja:

Ärztlich verschriebene Medikamente **Name**	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			
4.			
5.			
Selbstgekaufte Medikamente (ohne Verschreibung) **Name**	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			

11. Sind Sie von Zuzahlungen befreit? ☐ **Nein** ☐ **Ja**

12. Wenn Sie an Ihre Erkrankung denken: Haben Ihnen Angehörige oder Freunde/Bekannte **in den letzten 4 Wochen** geholfen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an wobei:

	Verrichtungen	**Wie viele Stunden pro Woche?**	**Was wurde gemacht?**
☐	Bei pflegerischen Leistungen		
☐	Bei Arztbesuchen/ Therapien		
☐	Bei der Besorgung von Medikamente		
☐	Hilfe im Haushalt		
☐	Sonstiges:		

13. Haben Sie **in den letzten 6 Monaten** einen Rentenantrag gestellt?

☐ **Nein**, ich bin schon Rentner

☐ **Nein**, ich habe keinen Antrag gestellt

☐ **Ja**, der Antrag wurde aber noch nicht bewilligt

☐ **Ja**, ich wurde berentet am _____ Art der Rente?_____

Wenn Sie erwerbstätig sind: Bitte beantworten Sie noch Frage 14 und 15.

Wenn Sie nicht erwerbstätig sind: Der Fragebogen ist hier beendet.
Vielen Dank für Ihre Mitarbeit!

14. Konnten Sie wegen Ihrer Erkrankung **in den letzten 6 Monaten** nicht arbeiten?

☐ **Nein** ☐ **Ja**. Falls ja, waren Sie:

	Zustand	**Wie lange?**
☐	Krankgeschrieben **mit ärztlichem Attest**	**Tage**
☐	Krank, aber **ohne ärztliches Attest**	**Tage**
☐	Von der Arbeit **abwesend** (z. B. wegen Arztbesuche oder Krankengymnastik)	**Stunden**

15. Haben Sie **in den letzten 6 Monaten** wegen Ihrer Erkrankung an einer der folgenden beruflichen Maßnahmen teilgenommen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie an welche:

	Maßnahme	**Wie lange?**	***Wer hat die Maßnahme finanziert?***
☐	Umschulung	Wochen	☐ Arbeitsamt ☐ Arbeitgeber ☐ Selbst ☐ Sonstige: _____
☐	berufliche Fördermaßnahme	Wochen	
☐	Weiterbildung	Wochen	
☐	Sonstiges:	Wochen	

Vielen Dank für Ihre Mitarbeit!

Fragebogen zur Erfassung von Ressourcenverbrauch

Study: Evaluation of a compensatory cognitive rehabilitation program among patients with brain injury
Health condition: Traumatic brain injury

Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Ludwig
Maximilians
Universität
München
LMU

Fragebogen zur Erfassung von Ressourcenverbrauch
6 Monate nach der Rehabilitation

1. Waren Sie **innerhalb der letzten 4 Wochen beim** Arzt (Praxis) wegen Ihrer Schädel-Hirn-Verletzung?
☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an bei welchem:

	Fachrichtung	**Wie oft?**
☐	Hausarzt/Allgemeinarzt	Mal
☐	Neurologe/Nervenarzt	Mal
☐	Facharzt für : _____	Mal

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Arztbesuche benutzt?		**Kosten der Fahrten <u>insgesamt</u>, falls bekannt**
☐ Öffentliche Verkehrsmittel ☐ Krankenwagen ☐ Sonstiges:	☐ Taxi ☐ Privat Pkw	

2. Haben Sie **in den letzten 6 Monaten** einen **Notdienst** aufgrund Ihrer Schädel-Hirn-Verletzung (z. B. epileptischer Anfall) in Anspruch genommen?

☐ **Nein**, ich habe keinen Notdienst in Anspruch genommen
☐ **Ja**, ich wurde im Krankenhaus in einer Notfallambulanz behandelt. Wie oft? _____
☐ **Ja**, ich habe einen Bereitschaftsarzt zu Hause benötigt. Wie oft? _____
☐ **Ja**, ich habe einen Krankenwagen nur mit Sanitätern benötigt. Wie oft? _____
☐ **Ja**, ich habe einen Krankenwagen mit Sanitätern und Notarzt benötigt. Wie oft? _____

3. Haben Sie **in den letzten 6 Monaten** eine Hilfsmittelversorgung (z. B. Gehhilfe, Rollstuhl, Schienen) wegen Ihrer Schädel-Hirn-Verletzung in Anspruch genommen?
☐ **Nein** ☐ **Ja**. Wenn ja:

Welche Hilfsmittel?	**Kosten <u>insgesamt</u>, falls bekannt**	**Mussten Sie etwas bezahlen?**
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten

Vorlage KUM/OC – fe (00-03-13)

4. Haben Sie **innerhalb der letzten 4 Wochen** Medikamente eingenommen? Falls ja, legen Sie bitte einen Teil der Medikamentenverpackung bei, aus dem der Name des Medikamentes ersichtlich ist.

☐ **Nein** ☐ **Ja**. Wenn ja:

Ärztlich verschriebene Medikamente **Name**	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			
4.			
5.			
Selbstgekaufte Medikamente (ohne Verschreibung) **Name**	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			

5. Sind Sie von Zuzahlungen befreit? ☐ **Nein** ☐ **Ja**

6. Konnten Sie wegen Ihrer Schädel-Hirn-Verletzung **in den letzten 6 Monaten** nicht arbeiten?

☐ **Nein** ☐ **Ja**. Falls ja, waren Sie:

	Zustand	**Wie lange?**
☐	Krankgeschrieben **mit ärztlichem Attest**	**Tage**
☐	Krank, aber **ohne ärztliches Attest**	**Tage**
☐	Von der Arbeit **abwesend** (z. B. wegen Arztbesuche oder Krankengymnastik)	**Stunden**

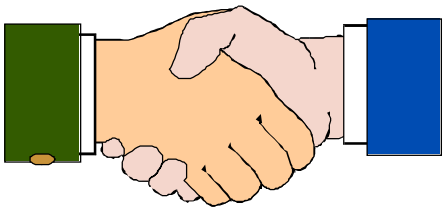
7. Haben Sie **in den letzten 6 Monaten** ambulante therapeutische Leistungen wegen Ihrer Schädel-Hirn-Verletzung in Anspruch genommen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Art der Therapie	**Wie oft?**
☐	Krankengymnastik (Physiotherapie) Therapiebezeichnung:	Mal
☐	Massage Therapiebezeichnung:	Mal
☐	Ergotherapie	Mal
☐	Neuropsychologie	Mal
☐	Logopädie	Mal
☐	Anwendungen vom Heilpraktiker	Mal
☐	Sonstiges	Mal

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Therapie benutzt?		**Kosten der Fahrten <u>insgesamt</u>, falls bekannt**
☐ Öffentliche Verkehrsmittel	☐ Taxi	Euro
☐ Krankenwagen	☐ Privat Pkw	
☐ Sonstiges:		

Danke !



Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Ludwig Maximilians Universität München

Fragebogen zur Erfassung von Ressourcenverbrauch
12 Monate nach der Rehabilitation

1. Waren Sie **innerhalb der letzten 4 Wochen** beim Arzt (Praxis) wegen Ihrer Schädel-Hirn-Verletzung?
☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an bei welchem:

	Fachrichtung	**Wie oft?**
☐	Hausarzt/Allgemeinarzt	Mal
☐	Neurologe/Nervenarzt	Mal
☐	Facharzt für : _____	Mal

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Arztbesuche benutzt?		**Kosten der Fahrten insgesamt, falls bekannt**
☐ Öffentliche Verkehrsmittel ☐ Krankenwagen ☐ Sonstiges:	☐ Taxi ☐ Privat Pkw	Euro

2. Sind Sie **in den letzten 12 Monaten** im Krankenhaus **in einer Tagesklinik** wegen Ihrer Schädel-Hirn-Verletzung behandelt worden? ☐ **Nein** ☐ **Ja**. Wenn ja:

In welcher Klinik?	**Fachabteilung**	**Wegen**	**Wie lange?**
			Tage
			Tage

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Tagesklinikbehandlung benutzt?		**Kosten der Fahrten insgesamt, falls bekannt**
☐ Öffentliche Verkehrsmittel ☐ Krankenwagen ☐ Sonstiges:	☐ Taxi ☐ Privat Pkw	Euro

3. Sind Sie **in den letzten 12 Monaten** im Krankenhaus **stationär** wegen Ihrer Schädel-Hirn-Verletzung behandelt worden?

☐ **Nein** ☐ **Ja**. Wenn ja:

In welchem Krankenhaus?	**Fachabteilung**	**Wegen**	**Wie lange?**
			Tage
			Tage

4. Haben Sie **in den letzten 6 Monaten** einen **Notdienst** aufgrund Ihrer Schädel-Hirn-Verletzung (z. B. epileptischer Anfall) in Anspruch genommen?

☐ **Nein**, ich habe keinen Notdienst in Anspruch genommen

☐ **Ja**, ich wurde im Krankenhaus in einer Notfallambulanz behandelt. Wie oft? _____

☐ **Ja**, ich habe einen Bereitschaftsarzt zu Hause benötigt. Wie oft? _____

☐ **Ja**, ich habe einen Krankenwagen nur mit Sanitätern benötigt. Wie oft? _____

☐ **Ja**, ich habe einen Krankenwagen mit Sanitätern und Notarzt benötigt. Wie oft? _____

5. Haben Sie **innerhalb der letzten 4 Wochen** Medikamente eingenommen? Falls ja, legen Sie bitte einen Teil der Medikamentenverpackung bei, aus dem der Name des Medikamentes ersichtlich ist. ☐ **Nein** ☐ **Ja**. Wenn ja:

Ärztlich verschriebene Medikamente **Name**	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			
4.			
5.			
Selbstgekaufte Medikamente (ohne Verschreibung) **Name**	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			

6. Sind Sie von Zuzahlungen befreit? ☐ **Nein** ☐ **Ja**

7. Haben Sie **in den letzten 6 Monaten** eine Hilfsmittelversorgung (z. B. Gehhilfe, Rollstuhl, Schienen) wegen Ihrer Schädel-Hirn-Verletzung in Anspruch genommen?

☐ **Nein** ☐ **Ja**. Wenn ja:

Welche Hilfsmittel?	**Kosten insgesamt, falls bekannt**	**Mussten Sie etwas bezahlen?**
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten

8. Haben Sie **in den letzten 6 Monaten** ambulante therapeutische Leistungen wegen Ihrer Schädel-Hirn-Verletzung in Anspruch genommen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Art der Therapie	**Wie oft?**
☐	Krankengymnastik (Physiotherapie) Therapiebezeichnung:	Mal
☐	Massage Therapiebezeichnung:	Mal
☐	Ergotherapie	Mal
☐	Neuropsychologie	Mal
☐	Logopädie	Mal
☐	Anwendungen vom Heilpraktiker	Mal
☐	Sonstiges	Mal

Welches Verkehrsmittel haben Sie auf dem Weg zu Ihrer Therapie benutzt?		**Kosten der Fahrten insgesamt, falls bekannt**
☐ Öffentliche Verkehrsmittel	☐ Taxi	Euro
☐ Krankenwagen	☐ Privat Pkw	
☐ Sonstiges:		

9. Haben Sie **in den letzten 12 Monaten** aufgrund Ihrer Schädel-Hirn-Verletzung Umbauten bzw. Anpassungen in Ihrem Haus bzw. in Ihrer Wohnung (z. B. Sitzerhöhung in der Toilette, Handlauf an der Wand) oder an Ihrem Arbeitsplatz vorgenommen?

☐ **Nein** ☐ **Ja**. Wenn ja:

Was wurde gemacht?	***Kostenträger***	**Höhe der Kosten, falls bekannt**
	☐ Krankenversicherung ☐ Rentenversicherung ☐ Pflegeversicherung ☐ Unfallversicherung ☐ Selbst	Euro
	☐ Krankenversicherung ☐ Rentenversicherung ☐ Pflegeversicherung ☐ Unfallversicherung ☐ Selbst	Euro

10. Haben Sie **in den letzten 12 Monaten** wegen Ihrer Schädel-Hirn-Verletzung an einer Selbsthilfegruppe teilgenommen?

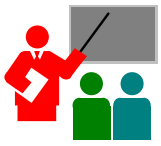
☐ **Nein**

☐ **Ja**: Wie oft im Monat? _____ Mal. Wie lange? _____ Monate.

11. Haben Sie **seit Ihrer Rehabilitation** wegen Ihrer Schädel-Hirn-Verletzung an einer der folgenden beruflichen Maßnahmen teilgenommen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Maßnahme	**Wie lange?**	***Wer hat die Maßnahme finanziert?***
☐	Umschulung	Wochen	☐ Arbeitsamt ☐ Arbeitgeber ☐ Selbst ☐ Sonstige: _____
☐	berufliche Fördermaßnahme	Wochen	
☐	Weiterbildung	Wochen	
☐	Sonstiges:	Wochen	



12. Besitzen Sie einen Schwerbehindertenausweis?

☐ **Nein** ☐ **Ja** mit Behinderungsgrad: _____% Welches Merkzeichen?_____

13. Konnten Sie wegen Ihrer Schädel-Hirn-Verletzung **in den letzten 12 Monaten** nicht arbeiten?
☐ **Nein** ☐ **Ja**. Falls ja, waren Sie:

	Zustand	**Wie lange?**
☐	Krankgeschrieben **mit ärztlichem Attest**	**Tage**
☐	Krank, aber **ohne ärztliches Attest**	**Tage**
☐	Von der Arbeit **abwesend** (z. B. wegen Arztbesuche oder Krankengymnastik)	**Stunden**

14. Haben Sie **seit Ihrer Rehabilitation** einen Rentenantrag gestellt?

☐ **Nein**, ich bin schon Rentner

☐ **Nein**, ich habe keinen Antrag gestellt

☐ **Ja**, der Antrag wurde aber noch nicht bewilligt

☐ **Ja**, ich wurde berentet am _____ Art der Rente?_____

Danke !

Fragebogen zur Erfassung von Ressourcenverbrauch

Study: Evaluation of a multidisciplinary prevention program against LBP: a randomized controlled trial in a nursing population
Health condition: Back Pain

Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Ludwig Maximilians Universität München

Fragebogen zur Erfassung von Ressourcenverbrauch und Kosten 12 Monate vor dem Präventionsprogramm

Liebe Teilnehmerin, lieber Teilnehmer,

Dieser Fragebogen ist Teil der Studie, an der Sie gerade teilnehmen. **Alle Fragen beziehen sich auf Ihre Rückenbeschwerden.** Bitte nehmen Sie sich ein paar Minuten Zeit und beantworten Sie die folgenden Fragen. Für Ihre Mitarbeit bedanken wir uns herzlich!

1. Waren Sie **innerhalb der letzten 12 Monaten beim** Arzt (Praxis) wegen Ihrer Rückenbeschwerden?
☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an bei welchem:

	Fachrichtung	**Wie oft?**
☐	Hausarzt	Mal
☐	Orthopäde	Mal
☐	Internist	Mal
☐	Neurologe	Mal
☐	Facharzt für :	Mal

2. Sind Sie **in den letzten 12 Monaten** im Krankenhaus **stationär** wegen Ihrer Rückenbeschwerden behandelt worden? ☐ **Nein** ☐ **Ja.** Wenn ja:

In welchem Krankenhaus?	**Fachabteilung**	**Grund der Behandlung**	**Wie viele Tage?**

3. Haben Sie **in den letzten 12 Monaten** an einer **Rehabilitationsmaßnahme („Kur“)** wegen Ihrer Rückenbeschwerden teilgenommen? ☐ **Nein** ☐ **Ja.** Wenn ja:

In welcher Klinik?	**Fachabteilung**	**Grund der Behandlung**	**Wie viele Tage?**

Vorlage KUM/OC – fe (00-03-13)

4. Haben Sie **innerhalb der letzten 12 Monaten** Medikamente wegen Ihrer Rückenbeschwerden eingenommen? ☐ **Nein** ☐ **Ja**. Wenn ja:

Ärztlich verschriebene Medikamente				
Medikamenten Gruppe	**Name des Medikamentes**	**Dachreichungsform**	**Dosierung am Tag (insgesamt)**	**Wie viele Tage?**
Schmerzmittel		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Muskelrelaxantia		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Selbstbesorgte Medikamente (ohne Verschreibung)				
Medikamenten Gruppe	**Name des Medikamentes**	**Dachreichungsform**	**Dosierung am Tag (insgesamt)**	**Wie viele Tage?**
Schmerzmittel		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Muskelrelaxantia		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		

5. Haben Sie **in den letzten 12 Monaten** aufgrund Ihrer Rückenbeschwerden (z. B. Hexenschuss, Bandscheibevorfall) einen **Notdienst** in Anspruch genommen?

☐ Nein, ich habe keinen Notdienst in Anspruch genommen
☐ Ja, ich wurde im Krankenhaus in einer Notfallambulanz behandelt. Wie oft? _____
☐ Ja, ich habe einen Bereitschaftsarzt zu Hause benötigt. Wie oft? _____
☐ Ja, ich habe einen Krankenwagen nur mit Sanitätern benötigt. Wie oft? _____
☐ Ja, ich habe einen Krankenwagen mit Sanitätern und Notarzt benötigt. Wie oft? _____

6. Haben Sie **in den letzten 12 Monaten** ambulante therapeutische Leistungen wegen Ihrer Rückenbeschwerden in Anspruch genommen?
☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Art der Therapie	**Wie oft?**
☐	Krankengymnastik (Physiotherapie) Therapiebezeichnung: _____	Mal
☐	Massage Therapiebezeichnung: _____	Mal
☐	Ergotherapie	Mal
☐	Psychotherapie wegen Rückenbeschwerden	Mal
☐	Psychotherapie, aber **nicht** wegen Rückenbeschwerden	Mal
☐	Rückenschule	Mal
☐	Anwendungen vom Heilpraktiker	Mal
☐	Anwendung vom Chiropraktiker	Mal
☐	PMR (Progressive Muskelrelaxaktion)	Mal
☐	Autogenes Training	Mal
☐	Sonstiges:	Mal

7. Haben Sie **in den letzten 12 Monaten** eine Hilfsmittelversorgung (z. B. Korsett, Bandagen, Einlagen) wegen Ihrer Rückenbeschwerden in Anspruch genommen?
☐ **Nein** ☐ **Ja**. Wenn ja:

Welche Hilfsmittel?	**Kosten <u>insgesamt</u>, falls bekannt**	**Mussten Sie etwas bezahlen?**
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten

8. Haben Sie **in den letzten 12 Monaten** wegen Ihrer Rückenbeschwerden körperlichen Aktivitäten unternommen? ☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Aktivität	**Wie viele Stunden in der Woche?**	**Wie lang?**
☐	Gymnastikkurs		Monate
☐	Gymnastik daheim		Monate
☐	Schwimmen		Monate
☐	Fitness-Studio		Monate
☐	PMR (Progressive Muskelrelaxaktion)		Monate
☐	Autogenes Training		Monate
☐	Sonstiges:		Monate
☐	Sonstiges:		Monate

9. Konnten Sie wegen Ihrer Rückenbeschwerden **in den letzten 12 Monaten** nicht arbeiten?
☐ **Nein** ☐ **Ja**. Falls ja, waren Sie:

	Zustand	**Wie lange?**
☐	Krankgeschrieben **mit ärztlichem Attest**	**Tage**
☐	Krank, aber **ohne ärztliches Attest**	**Tage**
☐	Von der Arbeit **abwesend** (z. B. wegen Arztbesuche oder Krankengymnastik)	**Stunden**

10. Haben Sie **in den letzten 12 Monaten** wegen Ihrer Rückenbeschwerden an einer der folgenden beruflichen Maßnahmen teilgenommen?
☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie an welche:

	Maßnahme	**Wie lange?**	**Wer hat die Maßnahme finanziert?**
☐	Umschulung	Wochen	☐ Arbeitsamt ☐ Arbeitgeber ☐ Selbst ☐ Sonstige: _____
☐	berufliche Fördermaßnahme	Wochen	
☐	Weiterbildung (z. B. Fortbildung in Heben und Tragen)	Wochen	
☐	Sonstiges:	Wochen	

Ludwig Maximilians Universität München

Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Fragebogen zur Erfassung von Ressourcenverbrauch und Kosten 3 Monate nach dem Präventionsprogramm

Liebe Teilnehmerin, lieber Teilnehmer,

Dieser Fragebogen ist Teil der Studie, an der Sie gerade teilnehmen.
Alle Fragen beziehen sich auf Ihre Rückenbeschwerden und erfassen den Zeitraum von 3 Monaten nach Ende des Präventionsprogramms.
Bitte nehmen Sie sich ein paar Minuten Zeit und beantworten Sie die folgenden Fragen.
Für Ihre Mitarbeit bedanken wir uns herzlich!

1. Waren Sie **innerhalb der letzten 3 Monaten beim** Arzt (Praxis) wegen Ihrer Rückenbeschwerden?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an bei welchem:

	Fachrichtung	**Wie oft?**
☐	Hausarzt	Mal
☐	Orthopäde	Mal
☐	Internist	Mal
☐	Neurologe	Mal
☐	Facharzt für :	Mal

2. Haben Sie **seit Ende des Präventionsprogramms** wegen Ihrer Rückenbeschwerden körperlichen Aktivitäten unternommen? ☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

Aktivität		**Wie viele Stunden in der Woche?**	**Wie lange?**
☐	Gymnastikkurs	Std. / Woche	Monate
☐	Gymnastik daheim	Std. / Woche	Monate
☐	Schwimmen	Std. / Woche	Monate
☐	Fitness-Studio	Std. / Woche	Monate
☐	Autogenes Training	Std. / Woche	Monate
☐	Sonstiges: _____	Std. / Woche	Monate

Vorlage KUM/OC – fe (00-03-13)

3. Haben Sie **innerhalb der letzten 3 Monaten** Medikamente wegen Ihrer Rückenbeschwerden eingenommen? ☐ **Nein** ☐ **Ja**. Wenn ja:

Ärztlich verschriebene Medikamente				
Medikamenten Gruppe	**Name des Medikamentes**	**Dachreichungsform**	**Dosierung am Tag (insgesamt)**	**Wie viele Tage?**
Schmerzmittel		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Muskelrelaxantia		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Selbstbesorgte Medikamente (ohne Verschreibung)				
Medikamenten Gruppe	**Name des Medikamentes**	**Dachreichungsform**	**Dosierung am Tag (insgesamt)**	**Wie viele Tage?**
Schmerzmittel		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Muskelrelaxantia		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		

4. Haben Sie **in den letzten 3 Monaten** ambulante therapeutische Leistungen wegen Ihrer Rückenbeschwerden in Anspruch genommen?

☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Art der Therapie	**Wie oft?**
☐	Krankengymnastik (Physiotherapie) Therapiebezeichnung: _____	Mal
☐	Massage Therapiebezeichnung: _____	Mal
☐	Ergotherapie	Mal
☐	Psychotherapie wegen Rückenbeschwerden	Mal
☐	Psychotherapie, aber **nicht** wegen Rückenbeschwerden	Mal
☐	Rückenschule	Mal
☐	Anwendungen vom Heilpraktiker	Mal
☐	Anwendung vom Chiropraktiker	Mal
☐	PMR (Progressive Muskelrelaxaktion)	Mal
☐	Autogenes Training	Mal
☐	Sonstiges:	Mal

5. Konnten Sie wegen Ihrer Rückenbeschwerden **in den letzten 3 Monaten** nicht arbeiten?
☐ **Nein** ☐ **Ja**. Falls ja, waren Sie:

	Zustand	**Wie lange?**
☐	Krankgeschrieben **mit ärztlichem Attest**	**Tage**
☐	Krank, aber **ohne ärztliches Attest**	**Tage**
☐	Von der Arbeit **abwesend** (z. B. wegen Arztbesuche oder Krankengymnastik)	**Stunden**

Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Ludwig Maximilians Universität München

Fragebogen zur Erfassung von Ressourcenverbrauch und Kosten 12 Monate nach dem Präventionsprogramm

Liebe Teilnehmerin, lieber Teilnehmer,

Dieser Fragebogen ist Teil der Studie, an der Sie gerade teilnehmen.
Alle Fragen beziehen sich auf Ihre Rückenbeschwerden und erfassen den Zeitraum von 12 Monaten nach Ende des Präventionsprogramms.
Bitte nehmen Sie sich ein paar Minuten Zeit und beantworten Sie die folgenden Fragen.
Für Ihre Mitarbeit bedanken wir uns herzlich!

6. Waren Sie **innerhalb der letzten 12 Monaten beim** Arzt (Praxis) wegen Ihrer Rückenbeschwerden?
☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an bei welchem:

	Fachrichtung	**Wie oft?**
☐	Hausarzt	Mal
☐	Orthopäde	Mal
☐	Internist	Mal
☐	Neurologe	Mal
☐	Facharzt für :	Mal

7. Sind Sie **in den letzten 12 Monaten** im Krankenhaus **stationär** wegen Ihrer Rückenbeschwerden behandelt worden? ☐ **Nein** ☐ **Ja**. Wenn ja:

In welchem Krankenhaus?	**Fachabteilung**	**Grund der Behandlung**	**Wie viele Tage?**

8. Haben Sie **in den letzten 12 Monaten** an einer **Rehabilitationsmaßnahme („Kur")** wegen Ihrer Rückenbeschwerden teilgenommen? ☐ **Nein** ☐ **Ja**. Wenn ja:

In welcher Klinik?	**Fachabteilung**	**Grund der Behandlung**	**Wie viele Tage?**

Vorlage KUMOC – fe (00-03-13)

9. Haben Sie **innerhalb der letzten 12 Monaten** Medikamente wegen Ihrer Rückenbeschwerden eingenommen? ☐ **Nein** ☐ **Ja**. Wenn ja:

Ärztlich verschriebene Medikamente				
Medikamenten Gruppe	**Name des Medikamentes**	**Dachreichungsform**	**Dosierung am Tag (insgesamt)**	**Wie viele Tage?**
Schmerzmittel		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Muskelrelaxantia		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Selbstbesorgte Medikamente (ohne Verschreibung)				
Medikamenten Gruppe	**Name des Medikamentes**	**Dachreichungsform**	**Dosierung am Tag (insgesamt)**	**Wie viele Tage?**
Schmerzmittel		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Muskelrelaxantia		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		
Sonstige:		☐ Tabletten ☐ Tropfen ☐ Injektionen ☐ Salbe		

10. Haben Sie **in den letzten 12 Monaten** aufgrund Ihrer Rückenbeschwerden (z. B. Hexenschuss, Bandscheibevorfall) einen **Notdienst** in Anspruch genommen?

☐ Nein, ich habe keinen Notdienst in Anspruch genommen
☐ Ja, ich wurde im Krankenhaus in einer Notfallambulanz behandelt. Wie oft? _____
☐ Ja, ich habe einen Bereitschaftsarzt zu Hause benötigt. Wie oft? _____
☐ Ja, ich habe einen Krankenwagen nur mit Sanitätern benötigt. Wie oft? _____
☐ Ja, ich habe einen Krankenwagen mit Sanitätern und Notarzt benötigt. Wie oft? _____

11. Haben Sie **in den letzten 12 Monaten** ambulante therapeutische Leistungen wegen Ihrer Rückenbeschwerden in Anspruch genommen?
☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

Art der Therapie		**Wie oft?**
☐	Krankengymnastik (Physiotherapie) Therapiebezeichnung: _____	Mal
☐	Massage Therapiebezeichnung: _____	Mal
☐	Ergotherapie	Mal
☐	Psychotherapie wegen Rückenbeschwerden	Mal
☐	Psychotherapie, aber **nicht** wegen Rückenbeschwerden	Mal
☐	Rückenschule	Mal
☐	Anwendungen vom Heilpraktiker	Mal
☐	Anwendung vom Chiropraktiker	Mal
☐	PMR (Progressive Muskelrelaxaktion)	Mal
☐	Autogenes Training	Mal
☐	Sonstiges:	Mal

12. Haben Sie **in den letzten 12 Monaten** eine Hilfsmittelversorgung (z. B. Korsett, Bandagen, Einlagen) wegen Ihrer Rückenbeschwerden in Anspruch genommen?
☐ **Nein** ☐ **Ja**. Wenn ja:

Welche Hilfsmittel?	**Kosten <u>insgesamt</u>, falls bekannt**	**Mussten Sie etwas bezahlen?**
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten
		☐ nein ☐ ja, einen Teil der Kosten ☐ ja, Gesamtkosten

13. Haben Sie **seit Ende des Präventionsprogramms** wegen Ihrer Rückenbeschwerden körperlichen Aktivitäten unternommen? ☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie bitte an welche:

	Aktivität	**Wie viele Stunden in der Woche?**	**Wie lang?**
☐	Gymnastikkurs		Monate
☐	Gymnastik daheim		Monate
☐	Schwimmen		Monate
☐	Fitness-Studio		Monate
☐	PMR (Progressive Muskelrelaxaktion)		Monate
☐	Autogenes Training		Monate
☐	Sonstiges:		Monate
☐	Sonstiges:		Monate

14. Konnten Sie wegen Ihrer Rückenbeschwerden **in den letzten 12 Monaten** nicht arbeiten? ☐ **Nein** ☐ **Ja**. Falls ja, waren Sie:

	Zustand	**Wie lange?**
☐	Krankgeschrieben **mit ärztlichem Attest**	**Tage**
☐	Krank, aber **ohne ärztliches Attest**	**Tage**
☐	Von der Arbeit **abwesend** (z. B. wegen Arztbesuche oder Krankengymnastik)	**Stunden**

15. Haben Sie **in den letzten 12 Monaten** wegen Ihrer Rückenbeschwerden an einer der folgenden beruflichen Maßnahmen teilgenommen? ☐ **Nein** ☐ **Ja**. Falls ja, kreuzen Sie an welche:

	Maßnahme	**Wie lange?**	**Wer hat die Maßnahme finanziert?**
☐	Umschulung	Wochen	☐ Arbeitsamt ☐ Arbeitgeber ☐ Selbst ☐ Sonstige: _____ ____
☐	berufliche Fördermaßnahme	Wochen	
☐	Weiterbildung (z. B. Fortbildung in Heben und Tragen)	Wochen	
☐	Sonstiges:	Wochen	

Fragebogen zur Erfassung von Ressourcenverbrauch

Study: Evaluation of a multimodal therapy program for fibromyalgia patients
Health condition: Fibromyalgia

Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Ludwig Maximilians Universität München

Fragebogen zur Erfassung von Ressourcenverbrauch und Kosten 6 Monate vor der Tagesklinikbehandlung

Liebe Patientin,

Dieser Fragebogen ist Teil der Studie, an der Sie gerade teilnehmen.
Alle Fragen beziehen sich auf Ihre Fibromialgie und die damit verbundenen Erkrankungen.
Bitte nehmen Sie sich ein paar Minuten Zeit und beantworten Sie die folgenden Fragen.
Für Ihre Mitarbeit bedanken wir uns herzlich!

1. Waren Sie **innerhalb der letzten 4 Wochen** ambulant ärztlich wegen Ihrer Erkrankung bei:

Fachrichtung	**Besucht?**	**Wie oft?**
Allgemeinarzt/Praktischer Arzt	☐ ja ☐ nein	Mal
Orthopäde	☐ ja ☐ nein	Mal
Internist	☐ ja ☐ nein	Mal
Frauenarzt	☐ ja ☐ nein	Mal
Neurologe	☐ ja ☐ nein	Mal
Nervenarzt	☐ ja ☐ nein	Mal
Psychiater	☐ ja ☐ nein	Mal
Urologe	☐ ja ☐ nein	Mal
Hals-Nasen-Ohren-Arzt	☐ ja ☐ nein	Mal
Radiologe	☐ ja ☐ nein	Mal
Sonstiger Facharzt für : _____	☐ ja ☐ nein	Mal

Vorlage KUM/OC – fe (00-03-13)

2. Wurden Sie **innerhalb den letzten 4 Wochen** im Krankenhaus ambulant behandelt?

☐ Nein ☐ Ja. Wenn ja,

In welchem Krankenhaus?	**Fachabteilung**	**Wegen**

3. Sind Sie **in den letzten 6 Monaten** im Krankenhaus **stationär** wegen Ihrer Erkrankung behandelt worden?

☐ Nein ☐ Ja. Wenn ja:

In welchem Krankenhaus?	**Fachabteilung**	**Wegen**	**Wie lang?**

4. Sind Sie **in den letzten 6 Monaten** im Krankenhaus in einer anderen **Tagesklinik** wegen Ihrer Erkrankung behandelt worden?

☐ Nein ☐ Ja. Wenn ja:

In welchem Krankenhaus?	**Fachabteilung**	**Wegen**	**Wie lang?**

5. Haben Sie **in den letzten 6 Monaten** einen **Notdienst** aufgrund Ihrer Erkrankung (z. B. starke Schmerzen) in Anspruch genommen?

☐ Nein, ich habe keinen Notdienst in Anspruch genommen

☐ Ja, ich wurde im Krankenhaus in einer Notfallambulanz behandelt. Wie oft? _____

☐ Ja, ich habe einen Bereitschaftsarzt zu Hause benötigt. Wie oft? _____

☐ Ja, ich habe einen Krankenwagen nur mit Sanitätern benötigt. Wie oft? _____

☐ Ja, ich habe einen Krankenwagen mit Sanitätern und Notarzt benötigt. Wie oft? _____

6. Welche Medikamente haben Sie **innerhalb der letzten Woche** eingenommen?
(Sie Können wahlweise Verpackungen oder eine Medikamentenliste beilegen)

Name des Medikamentes	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			
4.			

7. Welche Medikamenten haben Sie sich **innerhalb der letzten Woche** selber gekauft?

Name des Medikamentes	**Dosierung am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			

8. Sind Sie von Zuzahlungen befreit? ☐ Nein ☐ Ja

9. Haben Sie **innerhalb der letzten 4 Wochen** ambulant folgende therapeutischen Leistungen wegen Ihrer Erkrankung in Anspruch genommen?

Art der Therapie		**Wie oft?**
☐ ja	Krankengymnastik (Physiotherapie) Therapiebezeichnung: _____	
☐ ja	Massage Therapiebezeichnung: _____	
☐ ja	Ergotherapie	
☐ ja	Psychologie/Psychotherapie	
☐ ja	Anwendungen vom Heilpraktiker	
☐ ja	Sonstiges: _____	

10. Haben Sie **in den letzten 6 Monaten** eine Hilfsmittelversorgung (z. B. Gehhilfe, Rollstuhl, Schienen, Bandagen, Einlagen) wegen Ihrer Erkrankung in Anspruch genommen?

☐ Nein ☐ Ja. Wenn ja:

Welche	**Kosten insgesamt, falls bekannt**	**Mußten Sie zuzahlen?**
		☐ Nein ☐ Ja
		☐ Nein ☐ Ja

11. Welche Fahrtkosten hatten Sie wegen Ihrer Erkrankung **für Arztbesuche und Therapien** und mit welchen Verkehrsmitteln haben Sie die Fahrten zu Arzt und Therapie unternommen?

Fahrmittel		**Wie oft im letzten Monat?**	**Höhe der Kosten, falls bekannt**
Taxi	☐ nein ☐ ja		
Öffentliche Verkehrsmittel	☐ nein ☐ ja		
Privat-Pkw	☐ nein ☐ ja		
Krankenwagen	☐ nein ☐ ja		

12. Haben Sie **in den letzten 6 Monaten** an einer Selbsthilfegruppe teilgenommen?

☐ Nein ☐ Ja. Wie oft im Monat? _____ Mal

13. Haben Sie **in den letzten 6 Monaten** an einer beruflichen Fördermaßnahme, Weiterbildung oder Umschulung teilgenommen?

☐ Nein ☐ Ja. Wenn ja: Wie lange? _____

Wer hat sie finanziert? ☐ Unfallversicherung

☐ Rentenversicherung

☐ Arbeitsamt

☐ Selbst

14. Besitzen Sie einen Schwerbehindertenausweis?

☐ Nein

☐ Ja mit Behinderungsgrad: _____% Welches Merkzeichen?_____

15. Wie viele Tage **in den letzten 6 Monaten** konnten Sie nicht arbeiten und waren krankgeschrieben (**mit ärztlichem Attest**)?

_____ Tage

16. Haben Sie **in den letzten 6 Monaten** einen Rentenantrag gestellt?

☐ Nein

☐ Ja, aber noch nicht bewilligt

☐ Ja, ich wurde berentet am _____

Art der Rente?_____

Gesundheitsökonomische Beratungsstelle der
Ludwig Maximilians Universität München

Ludwig Maximilians Universität München

Fragebogen zur Erfassung von Ressourcenverbrauch und Kosten 6 Monate nach der Tagesklinikbehandlung

Liebe Patientin,

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Alle Fragen beziehen sich auf Ihre Fibromialgie und die damit verbundenen Erkrankungen.
Bitte nehmen Sie sich ein paar Minuten Zeit und beantworten Sie die folgenden Fragen.
Für Ihre Mitarbeit bedanken wir uns herzlich!

1. Waren Sie **innerhalb der letzten 4 Wochen** ambulant ärztlich wegen Ihrer Erkrankung bei:

Fachrichtung	**Besucht?**	**Wie oft?**
Allgemeinarzt/Praktischer Arzt	☐ ja ☐ nein	Mal
Orthopäde	☐ ja ☐ nein	Mal
Internist	☐ ja ☐ nein	Mal
Frauenarzt	☐ ja ☐ nein	Mal
Neurologe	☐ ja ☐ nein	Mal
Nervenarzt	☐ ja ☐ nein	Mal
Psychiater	☐ ja ☐ nein	Mal
Urologe	☐ ja ☐ nein	Mal
Hals-Nasen-Ohren-Arzt	☐ ja ☐ nein	Mal
Radiologe	☐ ja ☐ nein	Mal
Sonstiger Facharzt für: _____	☐ ja ☐ nein	Mal

2. Wurden Sie **innerhalb den letzten 4 Wochen** im Krankenhaus ambulant behandelt?

☐ Nein ☐ Ja. Wenn ja,

In welchem Krankenhaus?	**Fachabteilung**	**Wegen**

3. Sind Sie nach Ende Ihrer Tagesklinikbehandlung **in den letzten 6 Monaten** im Krankenhaus **stationär** wegen Ihrer Erkrankung behandelt worden?

☐ Nein ☐ Ja. Wenn ja:

In welchem Krankenhaus?	**Fachabteilung**	**Wegen**	**Wie lang?**

4. Sind Sie nach Ende Ihrer Tagesklinikbehandlung **in den letzten 6 Monaten** im Krankenhaus in einer anderen **Tagesklinik** wegen Ihrer Erkrankung behandelt worden?

☐ Nein ☐ Ja. Wenn ja:

In welchem Krankenhaus?	**Fachabteilung**	**Wegen**	**Wie lang?**

5. Haben Sie **in den letzten 6 Monaten** einen **Notdienst** aufgrund Ihrer Erkrankung (z. B. starke Schmerzen) in Anspruch genommen?

☐ Nein, ich habe keinen Notdienst in Anspruch genommen

☐ Ja, ich wurde im Krankenhaus in einer Notfallambulanz behandelt. Wie oft? _____

☐ Ja, ich habe einen Bereitschaftsarzt zu Hause benötigt. Wie oft? _____

☐ Ja, ich habe einen Krankenwagen nur mit Sanitätern benötigt. Wie oft? _____

☐ Ja, ich habe einen Krankenwagen mit Sanitätern und Notarzt benötigt. Wie oft? _____

6. Welche Medikamente haben Sie **innerhalb der letzten Woche** eingenommen?
(Sie Können wahlweise Verpackungen oder eine Medikamentenliste beilegen)

Name des Medikamentes	**Wie viele Tabletten am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			
3.			
4.			

7. Welche Medikamenten haben Sie sich **innerhalb der letzten Woche** selber gekauft?

Name des Medikamentes	**Dosierung am Tag**		
	Morgens	**Mittags**	**Abends**
1.			
2.			

8. Sind Sie von Zuzahlungen befreit? ☐ Nein ☐ Ja

9. Haben Sie **innerhalb der letzten 4 Wochen** ambulant folgende therapeutischen Leistungen wegen Ihrer Erkrankung in Anspruch genommen?

Art der Therapie		**Wie oft?**
☐ ja	Krankengymnastik (Physiotherapie) Therapiebezeichnung: _____	
☐ ja	Massage Therapiebezeichnung: _____	
☐ ja	Ergotherapie	
☐ ja	Psychologie/Psychotherapie	
☐ ja	Anwendungen vom Heilpraktiker	
☐ ja	Sonstiges: _____	

10. Haben Sie **in den letzten 6 Monaten** eine Hilfsmittelversorgung (z. B. Gehhilfe, Rollstuhl, Schienen, Bandagen, Einlagen) wegen Ihrer Erkrankung in Anspruch genommen?

☐ Nein ☐ Ja. Wenn ja:

Welche	**Kosten insgesamt, falls bekannt**	**Mußten Sie zuzahlen?**
		☐ Nein ☐ Ja
		☐ Nein ☐ Ja

11. Welche Fahrtkosten hatten Sie wegen Ihrer Erkrankung **für Arztbesuche und Therapien** und mit welchen Verkehrsmitteln haben Sie die Fahrten zu Arzt und Therapie unternommen?

Fahrmittel		**Wie oft im letzten Monat?**	**Höhe der Kosten, falls bekannt**
Taxi	☐ nein ☐ ja		
Öffentliche Verkehrsmittel	☐ nein ☐ ja		
Privat-Pkw	☐ nein ☐ ja		
Krankenwagen	☐ nein ☐ ja		

12. Haben Sie **in den letzten 6 Monaten** an einer Selbsthilfegruppe teilgenommen?

☐ Nein ☐ Ja. Wie oft im Monat? _____ Mal

13. Haben Sie **seit Ihrer Tagesklinikbehandlung** an einer beruflichen Fördermaßnahme, Weiterbildung oder Umschulung teilgenommen?

☐ Nein ☐ Ja. Wenn ja: Wie lange? _____

Wer hat sie finanziert? ☐ Unfallversicherung
☐ Rentenversicherung
☐ Arbeitsamt
☐ Selbst

14. Besitzen Sie einen Schwerbehindertenausweis?

☐ Nein
☐ Ja mit Behinderungsgrad: _____% Welches Merkzeichen?_____

15. Wie viele Tage **in den letzten 6 Monaten** konnten Sie nicht arbeiten und waren krankgeschrieben (**mit ärztlichem Attest**)?

_____ Tage

16. Haben Sie **seit Ihrer Tagesklinikbehandlung** einen Rentenantrag gestellt?

☐ Nein

☐ Ja, aber noch nicht bewilligt

☐ Ja, ich wurde berentet am _____ Art der Rente?_____

10. Curriculum Vitae

Persönliche Daten

Carla Sabariego Tomás
geboren in São Paulo, Brasilien

Schulausbildung

1978-1989
Colégio Palmares in São Paulo

Studium

1990 - 1994
Studium der Psychologie an der „Universidade de São Paulo“ in São Paulo; Abschluß: Diplom

2000 – 2002
Postgradualer Studiengang „Öffentliche Gesundheit und Epidemiologie“ an der Ludwig-Maximilians-Universität in München; Abschluß: Magistra Public Health (MPH)

Berufspraxis

seit April 2008
Wissenschaftliche Mitarbeiterin des Instituts für Gesundheits- und Rehabilitationswissenschaften der LMU München

von Mai 2002 bis Dezember 2009
Wissenschaftliche Mitarbeiterin der Klinik und Poliklinik für Physikalische Medizin und Rehabilitation im Klinikum der Universität München – LMU

von November 2003 bis Dezember 2004
Hilfskraft in der Psychologischen Abteilung (Diagnostik) der Klinik für Dynamische Psychiatrie München (Klinik Menterschwaige)

1999-2002
Telefondienst und psychologische Beratung in der Kontakt und Beratungsstelle für psychische Kranke (KID), München (Ehrenamtlich)

Weiterbildung

1995-1997
Spezialisierung in klinischer Psychologie in der Abteilung für Psychiatrie und medizinische Psychologie der "Universidade Federal de Sao Paulo - UNIFESP"

München, den 18.01.2011

11. Publikationen

Brunner A, Sabariego C, Wildner M. (2003) Continued development of public health in public opinion: results of a representative population survey in Munich, Dresden, Vienna and Bern. Soz Praventivmedizin; 48(2):115-20.

Peters A, Sabariego C, Wildner M, Sangha Dagger O. (2004) Outcome sensitivity of the North American Spine Society Instrument with special consideration for the neurogenic symptoms of chronic back pain. Z Orthop Ihre Grenzgebiete, Jul-Aug; 142(4):435-41.

Sabariego C, Grill E, Brach M, Fritschka E, Mahlmeister J, Stucki G. (2010) Incremental cost-effectiveness analysis of a multidisciplinary renal education program for patients with chronic renal disease. Disabil Rehabil, 32(5):392-401.

Brach M, Sabariego C, Herschbach P, Berg P, Engst-Hastreiter U, Stucki, G. (2010) Cost-effectiveness of a cognitive behavioral group therapy for dysfunctional fear of progression in chronic arthritis patients. Journal of Public Health, Dec; 32(4):547-54

Sabariego C, Brach M, Stucki G: Development of an instrument to collect health care resource use data in the context of rehabilitation. Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin, in print

Sabariego C, Brach M, Herschbach P, Berg P, Stucki, G. (2010) Cost-effectiveness of a cognitive behavioural group therapy of dysfunctional fear of progression in cancer patients. European Journal of Health Economics, Aug 6. [Epub ahead of print]

Neubert S, Sabariego C, Stier-Jarmer M, Cieza A. (2010) Development of an ICF based patient education program. Patient Education and Counseling, Aug 10 [Epub ahead of print]

Eingereichte Publikationen

Sabariego C, Brach M, Stucki G: Identification of major direct medical cost categories among patients with musculoskeletal conditions undergoing outpatient rehabilitation (Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin, under review)

Sabariego C, Brach M, Stucki G: Determinants of major direct medical cost categories among patients with osteoporosis, osteoarthritis, back pain or fibromyalgia undergoing outpatient rehabilitation (*Journal of Rehabilitation Medicine*, under review)