

Patient-Centred Multidisciplinary Inpatient Care-Have Diagnosis-Related Groups an Effect on the Doctor-Patient Relationship and Patients' Motivation for Behavioural Change?

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Abstract

Introduction: The aim of this, the largest survey of patients performed to date, is to analyse the effects of diagnosis related groups (DRGs) on the doctor-patient relationship in the context of interdisciplinary patient-centered care. In addition, it is intended to investigate the possibility of motivating patients to change their behavioural patterns and lifestyle in the context of holistic therapy.

Methods: Over a period of five years, a continuous survey was performed of hospitalised patients who were exercising their entitlement to interdisciplinary therapy in an acute, inpatient setting.

Results: The therapy was evaluated as good to very good both with and without the conditions of the case tariff fee system. Effects of the diagnosis related groups on the quality of the doctor-patient relationship could not be demonstrated (Mann-Whitney U test, $p > 0,05$). A clear trend was evident in the influence on motivation to change behavioural patterns and lifestyle (Fisher's exact test, $p = 0,000$).

Conclusions: Studies of the effects of reimbursement systems in the context of interdisciplinary care are still in their infancy, despite the widespread use of diagnosis related groups. The mandatory character implicit in the case tariff fee system, which requires minimum qualitative standards for structural and procedural parameters in the context of providing interdisciplinary patient-centered care, can influence patients' behavioural patterns and lifestyle.

Keywords: patient-centered care, DRG, interdisciplinary care, holistic care, case tariff fee, interdisciplinary treatment, behavioural patterns, patient satisfaction, reimbursement system, lifestyle, effects

1. Introduction

One of the main principles in management is the necessity of "fit" between the organization and its surrounding, typically the market with all its stakeholders (Chorn, 1991). Cost pressures and quality management requirements have led to the introduction of diagnosis based remuneration systems for medical treatments in hospitals, which are intended to increase efficiency, transparency and quality in the hospital sector (Braun, Rau, & Tuschen, 2007). For each diagnosis, the therapeutically relevant activities are listed in (mostly national) classification codices, and only these are paid for by insurance companies, making it highly likely that hospitals adhere to them. However, the experience gathered in recent years with different European models shows that DRG systems are associated with technical and political challenges (McKee & Healy, 2002).

Although a large number of studies exist that investigate the influence of the DRG reimbursement system regarding efficiency, quality and technological innovation for hospitals, the overall effects remain unclear (Brügger, 2010). Moreover, there are no studies that analyse the qualitative influence of the introduction of DRGs on changing patients' behaviour patterns. Generally speaking, many patients consider the aim of high-quality treatment to consist of modern medical technology combined with interpersonal, patient-centred

care (Campbell, Roland, & Buetow, 2000). There are doubts that the latter cannot be completely granted in a DRG system since the resources allotted are fixed. Once these are used up, a patient could, strictly speaking, face discharge even if not fully recovered (only to be re-admitted with a new diagnosis), to prevent the hospital from losing money.

This situation is more likely for multi-morbid patients, which is why the present study focuses on this group. Furthermore, these are studied in a multi-modal, interdisciplinary therapy setting. An interdisciplinary approach is necessary in particular for complex diseases, or multi-morbid patients. The numbers of the latter is expected to increase drastically due to the general aging of the European society. Studies of interdisciplinary treatment concepts in the case of complex diseases indicate a better therapeutic outcome (Schulman, Mark, & Califf, 1998; Young, et al., 1998; Romeyke & Stummer, 2014). However, they are typically more expensive, and not necessarily completely covered by the insurance companies, making it even more important to compare their outcome to more traditional approaches.

2. Background

Case tariff fees, also known as diagnosis related groups (DRGs), are widespread internationally (Kimberly, de Pourville, & D'Aunno, 2008) and have also become established in Europe as reimbursement mechanisms in the inpatient sector (Langenbrunner & Wiley, 2002), with the aim of ensuring a more needs-oriented and efficient deployment of resources. Major goals are to shorten hospitalisation times, improve the transparency and comparability of hospital services, reduce cost increases and cut back over-capacity. The DRG system uses medical data, such as main and secondary diagnosis, procedure codes, and demographic variables, to classify individual patients to case groups based on their medical comparability to also grant economic (remuneration) similarity. In addition to the classification, further components of a reimbursement system based on DRGs are accounting rules and cost weights. The resulting evidence-based catalogue is expected to improve quality and the allocation of resources (van Bokhoven, Kok, & van der Weijden, 2003).

Since 2003, hospital services in Germany are financed in the form of diagnosis and procedure-oriented case tariff fees. The requirements as stated in the DRG outline are to be understood as minimum quality standards for the structures, processes and outcomes of providing inpatient care. To illustrate these, Figure 1-c shows parts of the requirements (together with their code), which are binding for the provision of interdisciplinary patient-centered inpatient care, which is the focus here.

- **structural quality**
 - Involvement of at least two physician disciplines (**OPS 8-918**)
 - Team under the direction of a specialist with the additional description (**OPS 8-918, 8-977**)
 - Application of at least three processes: psychotherapy, Physiotherapy, relaxation techniques, occupational therapy, medical Therapy training, sensorimotor training, labor space-workout, artistic therapy (art or music therapy) or other practicing therapies
 - Use of at least three therapeutic areas: Physiotherapy / Physical therapy, occupational therapy, pain management, cognitive behavioral therapy, psychotherapy (**OPS 8-983**)
 - at least three years of experience in the field of...(OPS 8-975)
 - Use of at least 5 of the following 8 therapeutic areas: Nutrition, hydrotherapy / thermal therapy, other Physical processes, phytotherapy, order therapy, exercise therapy, or a detoxifying process, additional procedures (manual therapy, acupuncture / Chinese medicine, homeopathy, neural therapy, arts therapy (art and music therapy)) (**OPS 8-975**)

Figure 1. Structural characteristics of selected interdisciplinary therapies (OPS 2013 version)

- **process quality**
 - interdisciplinary treatment (**OPS 8-918**)
 - defined treatment plan (**OPS 8-918**)
 - interdisciplinary diagnostics (**OPS 8-918**)
 - Review the course of treatment by a standardized therapeutic assessment (**OPS 8-918**)
 - each week a doctor and a psychotherapeutic individual interview (**OPS 8-918**)
 - At least 14 to a maximum of 20 days of treatment and less than 2,520 treatment at least 10 minutes or up to a maximum 13 days of treatment and treatment at least 1.680 minutes (**OPS 8-975**)
 - Therapy density of at least 11 hours per week (**OPS 8-983**)
 - Process-oriented treatment management (**OPS 8-983**)
 - Use the following instruments: Disease activity score 28 (DAS 28), Hannover Functional Ability Questionnaire, Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and Bath Ankylosing Spondylitis Functional Index (BASFI) (**OPS 8-983**)
 - the immediate start of pain therapy Physiotherapy or physical therapy needs be guaranteed (**OPS 8-983**)
 - Weekly interdisciplinary team meeting (**OPS 8-918, 8-97d, 8-977**)

Figure 2. Process-parameters of selected interdisciplinary therapies (OPS 2013 version)

- **outcome**
 - team meeting at least twice a week. Discussion of somatic involvement, regulatory and therapeutic social aspects, patient-related documentation of the previous results and further treatment goals (**OPS 8-975**)
 - standardized diagnostic assessment, determination of Disease activity, functional impairment, and the Pain scale at the beginning and end of the hospital stay (**OPS 8-983**)
 - Based monitoring for intensive care monitoring (**OPS 8-97b**)
 - Measurement of vital capacity at least twice daily (**OPS 8-97b**)
 - Blood gas analyzes at least twice daily (**OPS 8-97b**)
 - Documentation of the ON and OFF times at least 8 times daily during the waking periods for the duration Titration phase and at least three days under stable dose (**OPS 8-97e.2**)

Figure 3. Outcome-parameters of selected interdisciplinary therapies (OPS 2013 version)

These excerpts are mandatory requirements in the German DRG regulations for interdisciplinary patient-centered treatments of inpatients. They are evidence-based and have been the subject of numerous studies (Cabana et al., 1999; Erdek & Pronovost, 2004; Fransen & Riel, 2005).

As a rule, not every patient requires interdisciplinary care. However, for patients with complex chronic diseases and/or with multiple co-morbidities and/or mental issues, a holistic therapy plan is required. This is why the needs of the patient can be better satisfied by an interdisciplinary team than by a mono-modal approach (Cooper & Fishman, 2003). Moreover, the long-term effects tend to be better, as well (Chang et al., 2001).

The introduction of DRGs can be seen as a form of legitimizing the organization, a reaction to the expectations of society: efficiently allocating the resources in a costly health system as a rational act (Meyer & Rowan, 1977). This also explains why so many countries adopt the DRG model in isomorphic processes (DiMaggio & Powell, 1983). However, whether this has positive impacts also for the individual patient has to be questioned before the remuneration system is completely institutionalized (Walgenbach, 2002), especially since the payment scheme

for the medical treatment is not directly controlled by the patient, as would be the case in most other transactions, but by political institutions and insurance companies.

In the context of an aging society, multi-morbid cases are increasing in number, so it is important to check whether holistic approaches work and are well received under legally binding DRG conditions.

3. Method

Below, the method employed in this study is outlined.

3.1 Location

Between 01.01.2004 and 31.12.2008 an anonymous survey of 4,598 inpatients in an acute hospital specialized in patient-centred holistic care in Germany was done. The clinic provides interdisciplinary medical and therapeutic care for predominantly multimorbid patients with acute chronic diseases and has the status of a special facility. The latter are hospitals whose services cannot be properly reimbursed by means of the remuneration catalogues, in particular for medical reasons because of a large number of seriously ill patients, or for reasons deriving from the structure of patient care. Pursuant to §17b para 1 (15) KHG (Hospital Remuneration Act), special facilities may be excluded from the DRG remuneration system under certain conditions and for a limited time. From 2004 until and including 2006, the DRG system was thus not used in the hospital. From 2007 onwards, the basic conditions of the German DRG system were implemented in the hospital being studied, so that two groups of patients (01/2004-12/2006 without DRG context; 01/2007-12/2008 with DRG context) could be generated. Apart from the remuneration system, nothing in the hospital changed notably, creating the possibility to compare patients' satisfaction with and without DRG context.

3.2 Questionnaire

As a standard quality management activity, patient satisfaction is measured with an anonymous, brief questionnaire handed out to all inpatients on the day of their discharge to be filled in before they leave. The questions are to be rated on a 5-point Likert scale (with 1 equalling an excellent performance) and cover satisfaction with the treatment by the medical personnel as well as their help regarding the adoption of a healthier lifestyle in the future:

- How did the medical personnel explain your disease and therapy to you?
- How did the doctors approach your problem?
- How would you rate the possibilities to ask the doctors questions?
- Have you been given suggestions for a healthier lifestyle?
- Have you been given suggestions for healthier nutrition?
- Have you been given suggestions about relaxation?

No questions regarding socio-demographic characteristics are included to grant anonymity. As all further structures etc. remained stable and the patients did not know which remuneration modalities are used in the hospital, so the results before and after the introduction of the DRG system can be compared regarding changes.

3.3 Subjects

The patients surveyed had various combinations of diseases and disturbances of the musculoskeletal system and connective tissue, the circulatory system, the nervous system, respiratory organs, mental disorders, and pain conditions. During the entirety of their stay, all survey participants received patient-centered interdisciplinary treatment.

The treatments applied were evidence-based and best practice methods from hydro-/thermotherapy, physical therapy, phytotherapy, psychotherapy, lifestyle regulative therapy, and movement therapy. In addition, neural therapy, acupuncture, infiltrations, homoeopathy and dietary consultations were performed according to indication. For those under DRG conditions, all requirements as lined out in Figure 1-c were followed. All patients also applied holistic nursing. Holistic nursing is defined as “all nursing practice that has healing the whole person as its goal” (American Holistic Nurses' Association, 1998). The aim of the therapeutic approach is the complete consideration of all aspects of sickness and health (Romeyke & Stummer, 2013b).

The study complies with the requirements of the local ethical review committee and the targets of the privacy policy. Survey participants always retained the right to withdraw at any time, for any reason.

3.4 Statistical Analyses

Statistical analyses were performed using SPSS for Windows, Version 20.0 (SPSS Inc., U.S.A.). The metric variables were presented as means and medians while the spreads were stated as standard deviations and interquartile ranges.

Normal distribution tests were used to check the distribution form of constant numbers of a sample. A significant deviation from the normal distribution exists at $p < 0.05$. In such cases, non-parametric tests must be used for the variables concerned. The normal distribution tests in this study were performed using the Kolmogorov-Smirnov test. Comparison of two independent, non-normally distributed samples was done using the Mann-Whitney U test.

Box-and-whisker plots are shown to present the medians and quartiles. The median and 25th-75th quartiles were entered in the box; the whiskers correspond to the smallest and largest value as long as these are neither extreme values nor outliers. Outliers are defined as values lying 1 1/2 to 3 box lengths outside the box and are shown as circles in the diagrams; extreme values, which measure more than 3 box lengths outside the box, are entered as crosses.

The categorised data was evaluated by means of the exact Fisher test; all necessary requirements for this were fulfilled.

For all tests, a two-sided significance-test was carried out. A p-value of < 0.05 was assumed as statistically significant for all statistical tests.

4. Results

Of the 4,598 inpatients treated over the period reported in this study, 1,298 completed the questionnaire. Only these were included in the analysis. All in all, the evaluations were good. Regarding the explanation of the disease and its treatment, there were no significant differences between the two periods (Mann-Whitney U test, asymptotic significance (2-sided), $p=0.760$), which is shown in Table 1 and Figure 4.

Table 1. Explanations about disease and treatment

Period	Mean	Standard deviation	Median	Minimum	Maximum	N
01/2004-12/2006	1.57	.824	1.00	1	6	620
01/2007-12/2008	1.59	.877	1.00	1	6	669
total	1.58	.851	1.00	1	6	1,289

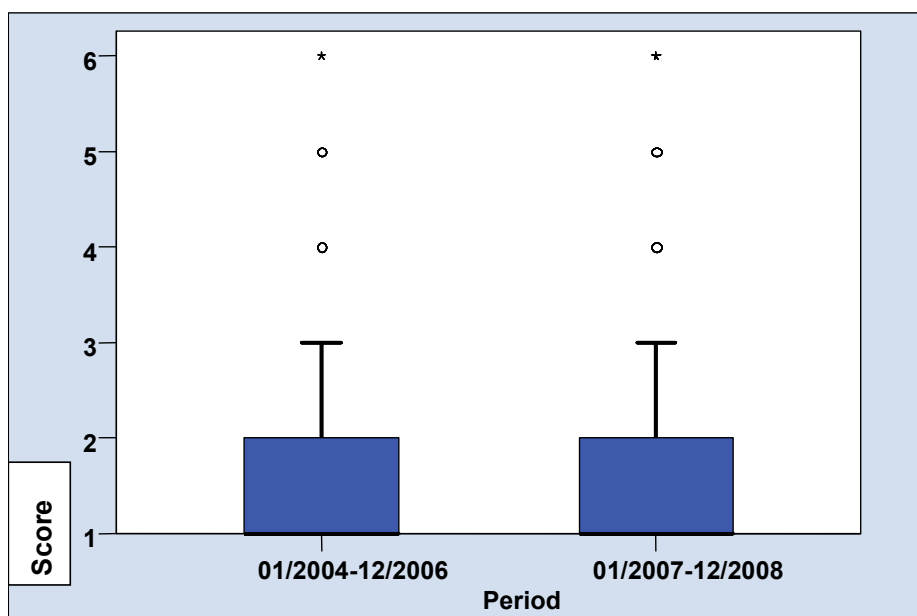


Figure 4. Explanations about disease and treatment

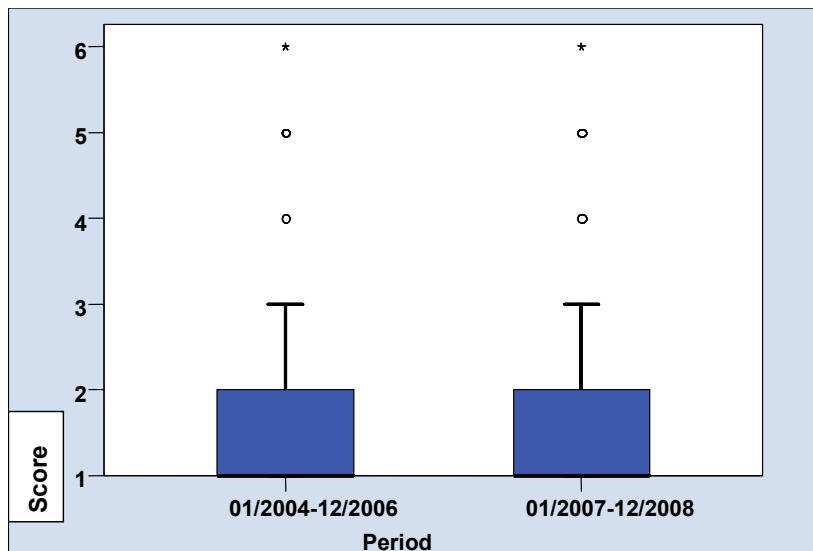


Figure 5. How did the doctors/physicians approach your problem?

Table 2. How did the doctors/physicians approach your problem?

Period	Mean	Standard deviation	Median	Minimum	Maximum	N
01/2004-12/2006	1.55	1.058	1.00	1	6	540
01/2007-12/2008	1.50	1.012	1.00	1	6	604
total	1.52	1.034	1.00	1	6	1,144

The question as to how the medical personnel approached the patients' problems was evaluated as good by a total of 1,144 patients (Figure 5, Table 2). The comparison of the two periods revealed no significant deviation (Mann-Whitney-U-Test, Asymptotic significance (2-sided), $p=0.484$).

The possibility of asking the doctors questions was evaluated as very good by a total of 1,243 patients. A very slightly higher level of satisfaction was detected under the conditions of the DRG system (Figure 6, Table 3). Statistical analysis of the two periods showed no significant differences (Mann-Whitney U test, asymptotic significance (2-sided), $p=0.098$).

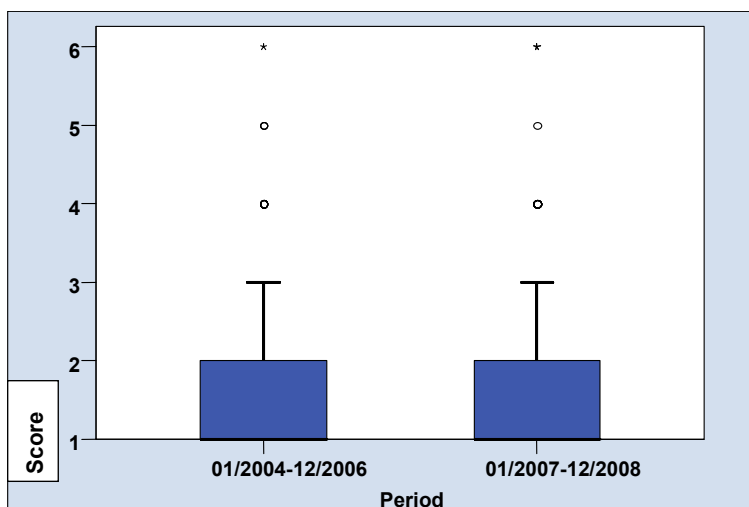


Figure 6. Opportunity to ask questions to doctors

Table 3. Opportunity to ask questions to doctors

Period	Mean	Standard deviation	Median	Minimum	Maximum	N
01/2004-12/2006	1.45	.716	1.00	1	6	599
01/2007-12/2008	1.39	.683	1.00	1	6	644
total	1.42	.699	1.00	1	6	1,243

A total of 1,457 patients replied to the question as to whether they had received suggestions for a “healthier lifestyle”. This was confirmed significantly under the conditions of the case tariff fee system (chi-squared according to Pearson $p \leq 0.05$, exact test according to Fisher $p \leq 0.05$; Figure 7, Tables 4, 5). 0 cells (0.0%) have an expected frequency of less than 5). The minimum expected frequency is 221.24.

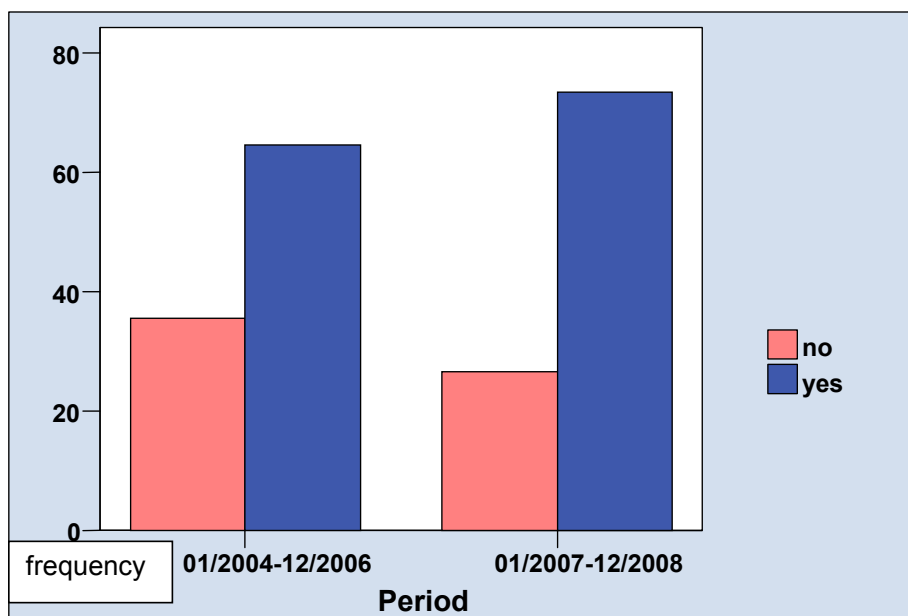


Figure 7. Suggestions for a healthier lifestyle

Table 4. Suggestions for a healthier lifestyle

			Period		Total
			01/2004-12/2006	01/2007-12/2008	
Have you been given suggestions for a healthier lifestyle?	no	N	265	189	454
		% of suggestions for a healthier lifestyle?	58.4%	41.6%	100.0%
		% of period	35.5%	26.6%	31.2%
	yes	N	482	521	1,003
		% suggestions for a healthier lifestyle	48.1%	51.9%	100.0%
		% of period	64.5%	73.4%	68.8%
total		N	747	710	1,457
		% suggestions for a healthier lifestyle	51.3%	48.7%	100.0%
		% of period	100.0%	100.0%	100.0%

Table 5. Suggestions for a healthier lifestyle

	value	Asymptotic (2-sided)	Significance	Exact (2-sided)	significance	Exact (1-sided)	significance
Pearson's chi-square	13.308	.000					
Fisher's exact test				.000		.000	
Number of valid cases	1457						

The question about suggestions for healthier nutrition was answered by 1,457 patients. No significant difference could be demonstrated between the two periods (chi-squared according to Pearson $p > 0.05$, exact test according to Fisher $p > 0.05$; Figure 8, Tables 6, 7). 0 cells (0.0%) have an expected frequency of less than 5). The minimum expected frequency is 346.47.

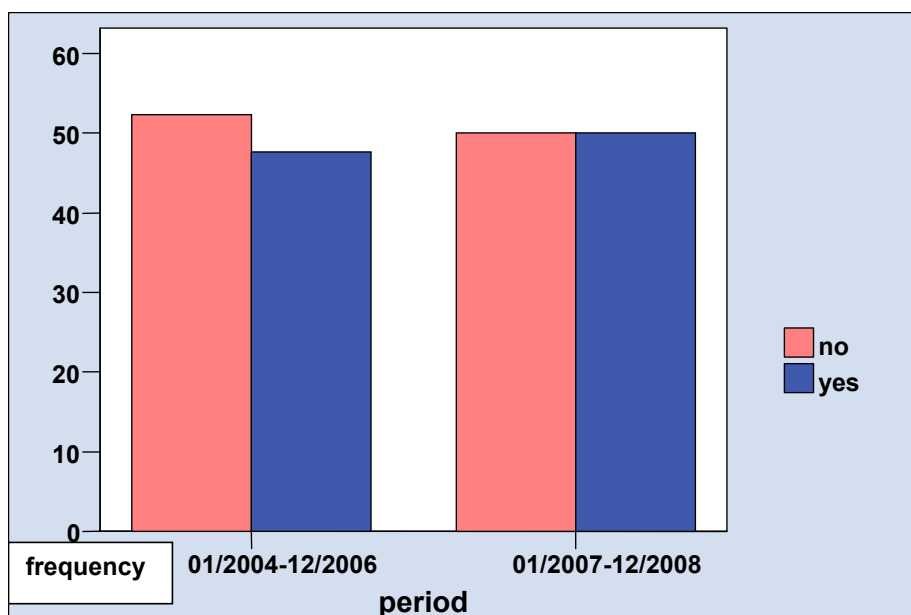


Figure 8. Suggestions for healthier nutrition

Table 6. Suggestions for healthier nutrition

		Period		Total	
		01/2004-12/2006	01/2007-12/2008		
Have you been given suggestions for healthier nutrition?	no	N	391	355	746
		% of suggestions for healthier nutrition	52.4%	47.6%	100.0%
		% of period	52.3%	50.0%	51.2%
	yes	N	356	355	711
		% of suggestions for healthier nutrition	50.1%	49.9%	100.0%
		% of period	47.7%	50.0%	48.8%
Total	N	747	710	1457	
	% of suggestions for healthier nutrition	51.3%	48.7%	100.0%	
	% of period	100.0%	100.0%	100.0%	

Table 7. Suggestions for healthier nutrition

	value	Asymptotic Significance (2-sided)	Exact significance (2-sided)	Exact significance (1-sided)
Pearson's chi-square	.800	.371		
Fisher's exact test			.373	.200
Number of valid cases	1457			

The question as to whether they had been given suggestions about relaxation was answered by a total of 1,457 patients. Comparison of the two periods showed a significant difference under the conditions of the DRG system (chi-squared according to Pearson $p \leq 0.05$, exact test according to Fisher $p \leq 0.05$; Figure 9, Tables 8, 9). 0 cells (0.0%) have an expected frequency of less than 5). The minimum expected frequency is 317.23.



Figure 9. Suggestions for relaxation

Table 8. Suggestions for relaxation

			Period		Total
			2004-2006	2007-2008	
Have you been given suggestions about relaxation?	no	N	390	261	651
		% of suggestions for relaxation	59.9%	40.1%	100.0%
		% of period	52.2%	36.8%	44.7%
	yes	N	357	449	806
		% suggestions for relaxation	44.3%	55.7%	100.0%
		% of period	47.8%	63.2%	55.3%
Total	N	747	710	1,457	
	% suggestions for relaxation	51.3%	48.7%	100.0%	
	% of period	100.0%	100.0%	100.0%	

Table 9. Suggestions for relaxation

	value	Asymptotic Significance (2-sided)	Exact significance (2-sided)	Exact significance (1-sided)
Pearson's chi-square	35.147	.000		
Fisher's exact test			.000	.000
Number of valid cases	1457			

5. Discussion

The methodological identification of the direct effects of the introduction of a case fee tariff remuneration system is extremely difficult. However, the present study presents a quasi-intervention design, as nothing but the remuneration system used at the hospital changed. Due to that, two cross-sectional data sets can be compared.

Patient satisfaction was on high levels before and after the introduction of the DRG remuneration system in the hospital investigated. This could be interpreted as the result of the "content": the positive influence of interdisciplinary patient-centered care on patient satisfaction has been documented in numerous studies (Bjegovich-Weidman, 2010; Romeyke & Stummer, 2013; Sainsbury et al., 1995). Still, the stability of satisfaction levels is a good sign.

No effects were detected regarding the doctor-patient relationship. Nonetheless, the results are noteworthy in view of the frequent assumption that DRG systems lead to intensified work and deteriorating working conditions (Baller & Oestreich, 2005) for medical personnel, which would automatically affect the way they interact with patients in the long run. However, this could be prevented by either (a) a decoupling of structure and actions (Walgenbach, 2002), with doctors due to high work morals trying to balance potential negative outcomes of the DRG system for individual patients, or (b) by the requirements presented in the DRG system. In multi-modal pain therapy (OPS 8-918, Figure 2), for example, individual meetings with the doctor and daily visits are mandatory. The mandatory use of therapy objectives and their evaluation (Figure 2) (Romeyke & Stummer, 2011) as well as patient reported outcome (Figure 2) can also make a contribution to patient satisfaction in case these are used for explaining the disease(s) and subsequent treatment(s) (Neugebauer, 2011).

Changes for the better were observed regarding the promotion of behavioural change in DRG contexts. This can be attributable to clearer goals, intensive interaction with the medical personnel, and/or the use of cognitive behavioural therapy (Figure 1) (Blanchard, 2001; Dunn et al., 1999). Lifestyle-regulative therapy as an integral component of interdisciplinary care (Figure 1) can also help the patient to develop health-promoting behavioural patterns in their everyday life (Astin, Shapiro, Eisenberg, & Forsys 2003; Wahbeh, Elsas, & Oken, 2008). Until now, there are no mandatory quality requirements for suggestions for relaxation or nutrition. Since both can have a tremendous effect, this makes the results even more promising.

6. Conclusion

The introduction of a DRG remuneration system in an interdisciplinary setting at an acute hospital did not result in negative effects regarding patient satisfaction. A significantly higher number of prompts for positive behavioural change were reported by the patients after the change. Thus, the aim to better allocate resources via the DRG system seems to have been reached regarding the increased likelihood of sustainable health effects in an interdisciplinary patient-centered context. Nevertheless, doctors should be interviewed to check whether the positive results seen in the present study result from a decoupling of structure and actions (Walgenbach, 2002).

Indication-based studies to evaluate the efficacy and efficiency of multi-modal therapies with a patient-centered focus have to be pursued further. In particular, these should further evaluate patient-reported quality parameters - including the economic aspects in the context of ever scarcer resources within the health system. Further studies are also necessary to investigate patient satisfaction with interdisciplinary treatment in other countries with a case tariff fee remuneration system.

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Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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