



# **G-DRG-Impact evaluation**

## **according to sec. 17b para. 8**

### **Hospital Finance Act**

Final Report of the first research cycle  
(2004 to 2006)

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Analysis by order of the German Institute for the Hospital Remu-  
neration System (InEK)

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## Executive Summary

In 2004, after one optional year, a diagnosis and procedure related case-based flat-rate remuneration system for almost all inpatient services was introduced in Germany. The [G-]DRG system ([German-] Diagnosis-Related Groups) has led to a “product-definition” of inpatient services. Based on this, hospital budgets are defined prospectively and the individual level of reimbursement per case is set. The introduction of a DRG system aims at enhancing efficiency, competition, the development of demand based service structures, ensuring the quality of care and increasing transparency within the hospital sector.

Identical provision of services leads to an identical reimbursement in the G-DRG system (assumed that base-rates of hospitals are identical as well). This nationwide applied system is aimed at ensuring that “payment should be based on provided services”.

In addition to the favored developments, such elementary changes in hospital reimbursement and incentive structures may give rise to unintended or even unforeseen effects.

When introducing the new reimbursement system, the legislator had therefore commissioned the self-governing bodies according to sec. 17b para. 8 Hospital Finance Act to conduct an impact evaluation in the form of subsidiary research, focused on changes of (infra-)structures and quality of care within the inpatient sector as well as effects on other health care sectors including the extent of service shifts from one care sector to another.

However, six years after the implementation of the G-DRG system, the G-DRG impact evaluation can't be an early-warning system anymore. In the past years the German Institute for the Hospital Remuneration System (InEK) has published substantial evaluation data on this topic, yet the data did not meet all of the requirements of the federally mandated impact evaluation entirely. The members of the self-governing bodies of the inpatient care system (German Hospital Federation, National Association of Statutory Health Insurance Funds, Association of German private health-care insurers) therefore designed a research concept for the impact evaluation according to sec. 17b para. 8 Hospital Finance Act. The G-DRG impact evaluation was tendered in a pan-European two-level process in May 2008, for which IGES Institute was awarded the bid.

The first research cycle solely refers to the G-DRG system introduction phase of the years 2004 to 2006, and thus examines a comparatively short period of time right after the system introduction. However, a multitude of stakeholder reactions in regard to the G-DRG system implementation may

only come into effect over a longer period of time. On this account, a second research cycle will examine the G-DRG system convergence phase including the years 2006 to 2008. An optional third research cycle would evaluate the years 2008 to 2010 at the end of the convergence phase. This subdivision into three research cycles allows readjusting the research concept if necessary and to consider new developments in research or latest findings.

The impact evaluation rests on a broad empirical data base. This includes questionnaire surveys of all hospitals accredited according to sec. 108 Social Security Code No. 5, of all Statutory and Private Health Insurance Funds, of the Medical Review Board of the Statutory Health Insurance Funds and of relevant stakeholders of the inpatient care sector. Furthermore, highly aggregated G-DRG data according to sec. 21 KHEntgG, data on hospitals collected by the Federal Office of Statistics and data from the National Institute for Quality in Health Care (BQS) was provided. These datasets are part of the impact evaluation and can be downloaded from the InEK homepage as a user-friendly database.

Due to the simultaneous and nationwide implementation, the impact evaluation can only be based on data provided by hospitals participating in the G-DRG system introduction phase. Therefore, changes in the course of time can be described, yet no reliable conclusion about their causes can be drawn due to missing reference ranges. Furthermore numerous developments occurring contemporaneously with the implementation of the G-DRG system might have influenced the parameters analyzed for the impact evaluation. The distinction between effects based solely on G-DRG implementation and any other plausible influencing factors is hardly achievable. In terms of methodology, the impact evaluation will be able to depict actual changes, yet there can't be a conclusive identification of a causal relationship between introduction of the G-DRG system and a specific change within inpatient care sector. It is advisable for future planning, to outline a design of an impact evaluation at an early stage, and to collect necessary data prospectively prior to implementing a new reimbursement system in the health care sector.

### **Effects on structure and medical services of the inpatient care sector**

In order to identify a possible influence of the G-DRG implementation on the structure of service provision, relevant indicators were analyzed longitudinally if methodologically feasible. The results revealed that essential structural parameters of the inpatient care sector followed long-range trends. The G-DRG system neither caused a strengthening nor a weakening of current trends. The density of supply of medical services (number of hospitals, hospital beds per 100.000 inhabitants) slightly decreased as well as

no observations were made on short-term capacity adjustments by hospitals at state-level or in terms of hospital size. Merely an above-average decline in the number of hospital departments was observed between 2003 and 2006. Drivers for this above-average reduction were mainly the hospital departments of gynecology and obstetrics, internal medicine, surgery and ENT. These changes correspond to the overall decline in the number of hospitals. In some highly specialized and rare medical specialties an increase in the number of departments was observed (e. g. neurosurgery, plastic surgery, pediatric surgery). In consideration of multiple confounding variables these changes can't exclusively be ascribed to the introduction of the G-DRG system.

Results of the conducted hospital survey state that the G-DRG system has led to organizational and operational structure adjustments within the hospitals. According to the survey, hospitals consider their structural developments in the medical and nursing field (e. g. founding of medical centers, set-up or expansion of sub-specializations) and the explicit set-up or expansion of departments or positions for medical cost control, medical coding and discharge management to be closely connected with the implementation of the G-DRG system. Hospitals stated that the G-DRG implementation had crucial effects on the internal reorganizational activities aiming at an improved economical internal service provision. The implementation is also seen as a determining factor for overall adjustments of operational structures, for instance advanced interdisciplinary cooperation and the use of IT and controlling instruments. In contrast to that, changes of organizational structures in secondary-medical and non-medical departments which a high share of hospitals has carried out (e. g. centralization of laboratory, purchasing department or administration), were, according to the survey, not predominantly motivated by the G-DRG implementation.

The extension of the number of large medical devices monitored for hospitals proceeded faster during the introduction phase of the G-DRG implementation than before within all bed sizes. The survey states that half of all hospitals invested in large medical devices due to the G-DRG implementation, and a high share of these hospitals used the new large medical devices in cooperation with physicians in private practice and ambulatory medical centers.

Between 2003 and 2006, the number of full-time employees as well as the employee workload, derived from the number of cases and inpatient days of care, developed heterogeneously throughout the professions, yet showing a continuance in the long-range trend. However, for some professions the trend intensified in the period of observation compared to the previous period (for instance a stronger decline of the average number of inpatient cases per full-time physician, weaker decrease in the average inpatient days of care per full-time nurse). The limitations of the indicators and the mani-

fold factors influencing the workforce (e. g. changes in inpatient treatment need) inhibit any conclusive identification of an influence solely based on the G-DRG implementation.

Potential effects of the G-DRG implementation on hospital employee satisfaction were analyzed by means of a systematic literature research. Yet, research projects on employee satisfaction usually do not focus on potential effects of a change in reimbursement systems. Additional and improved research would be desirable in this field as well as in the field of patient satisfaction. The study “Change of Medicine and Nursing in the DRG-System” (WAMP) reveals the following results for physicians’ and nursing staff’s job satisfaction:

While 70% of all surveyed physicians see a negative influence of the G-DRG implementation on motivation and job satisfaction, and 80% on general conditions of work, a positive perception of work is widely spread, and the share of physicians with this perception did not vary between the surveys in 2004 and 2006. The share of physicians who would decide for their profession again, increased significantly between 2004 and 2006. About half of all surveyed nursing staff perceived a negative effect of the G-DRG implementation on motivation, job satisfaction and general conditions of work. The share of nursing staff perceiving a negative effect on general conditions of work strongly increased in 2006. In contrast to the physicians interviewed, the share of nursing staff that already thought about changing their profession increased significantly.

On the basis of published data, the results did not yield a definite change of physicians’ and nursing staff’s job satisfaction due to the implementation of the G-DRG system. Nevertheless, hospital employees value the G-DRG system’s effect on motivation, job satisfaction and general conditions of work rather negatively. The hospital and stakeholder surveys show similar results.

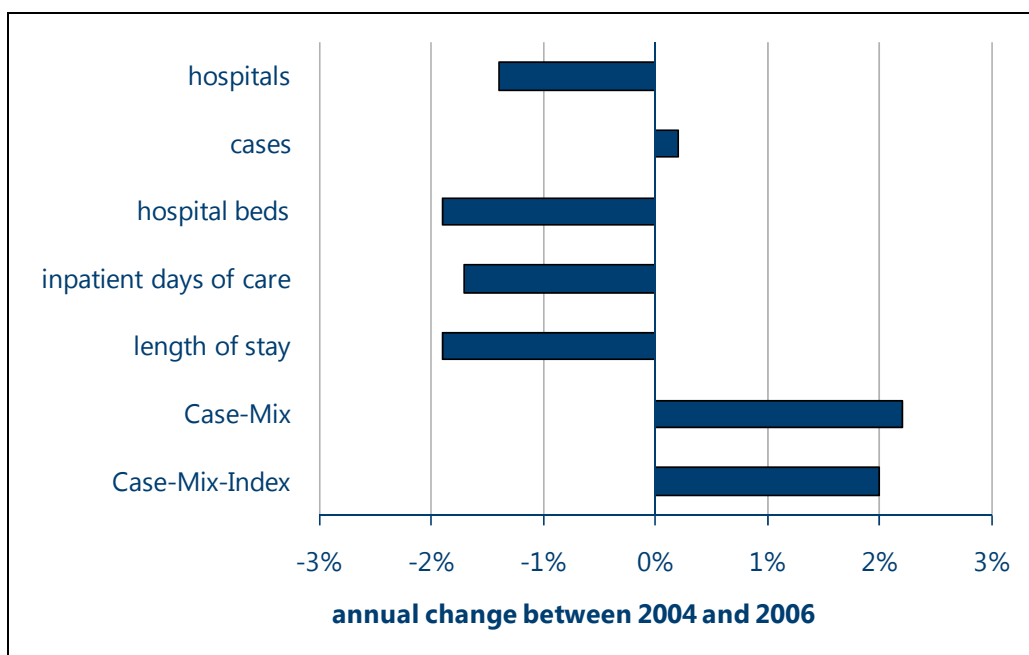
In theory, fee per case reimbursement systems imply (misdirected) economic incentives to increase the number of cases; by subdividing a hospital stay into several cases (case-splitting), a higher reimbursement could be achieved. The design of the G-DRG system contains regulations to prevent a potential increase in the number of cases. No observation of an increase in the number of cases was made after G-DRG implementation. During the introduction phase (2004-2006) the number of inpatient cases increased marginally by 0.2% annually to 16.23 million cases in 2006; after age standardization the number of cases fell by 0.4% for this period. A change in the number and structure of cases with referrals to other hospitals was not observed.

One of the main objectives of the G-DRG implementation was to reduce the incentive for an extended length of stay that results from a per diem

reimbursement system. After introducing the G-DRG system, the length of stay continually decreased, though no strengthening of this decrease could be observed. Between 2004 and 2006 the length of stay dropped from 7.77 days to 7.47 days, which is an annual decrease of 1.9%. Yet, the influence of demographic development on the length of stay in this context needs to be considered as well: Assuming a stable age distribution, the length of stay would have dropped slightly stronger, by 2.5% annually. According to the long-range trend, the number of inpatient days of care has decreased by 1.7% annually for the same time period.

On the contrary, the case-mix-index shows an annual 2.0% increase during the G-DRG introduction phase. The case-mix increased by 2.2% annually. These changes may result from changes in medical documentation, the G-DRG catalogue or the invoicing conditions and from varying case-morbidity. Due to the high level of data aggregation, a quantification of those parameters is not feasible.

Figure 1: Development of important parameters (2004-2006)



Source: IGES, Federal Office of Statistics, InEK

In theory, the fee per case system provides an incentive for hospitals to focus on the more profitable G-DRGs and to perform risk selection (preferably not to treat patients with a high economic risk for hospitals). This could affect the structures of service provision and the access to inpatient care. The structure of service provision changed between 2004 and 2006. A direct influence of the G-DRG system implementation can't be measured. Influencing factors such as the demographic trend and resulting shifts of

disease prevalence, effects derived from the benefits catalogue according to sec. 115b Social Security Code No. 5 (outpatient surgery in hospitals) or developments in other care sectors may have affected the hospitals' structures of service provision as well. When examining specialization and diversification activities (based on the number of adjacent DRGs representing 80%, 90% or 100% of the hospitals' cases), no distinctive changes were observed between 2004 and 2006, hence no broad specialization could be verified. Nevertheless, the number, respectively the share of hospitals that provide treatment has obviously changed in some medical fields. Usually those changes (e. g. in ENT or obstetrics) are related to distinct developments in the number of hospital departments. Concentration of service structures was monitored for instance for breast-cancer treatment; service structure diversification was monitored for example for invasive cardiology. Nevertheless, a systematic influence of the G-DRG system implementation on service structure specialization or diversification could not be verified.

Corresponding to that, access to inpatient treatment, measured with the average distance between the place of residence and the hospital, did not change overall at federal level. The average measured (street-)distance between the place of residence and hospital (22.4 km) as well as the average shortest journey time (22.0 min) remained unchanged for inpatients between 2004 and 2006. Regional variations in the structures of service provision and their developments could not be examined. However, structural changes have affected the access to some inpatient services. Changes in the total number of departments and the supply of medical services have had an influence on the overall access to inpatient care, yet again an influence on access can't be solely attributed to the implementation of the G-DRG system.

### **Effects on economic efficiency**

Between 2003 and 2006, the adjusted total hospital costs increased considerably slower (-1.4% annually) than between 1991 and 2006 (3.7% annually). In contrast to that, the adjusted average cost per inpatient case increased slightly stronger (2.4% annually) than between 1991 and 2006 (2.3% annually). This cost increase primarily resulted from a rise in non-personnel costs by total 3.24 bn. Euro (thereof 1.3 bn. Euro additional costs for medical supply), while personnel costs increased by 0.86 bn. Euro. The moderate increase in personnel costs is mainly due to the reduction of cost for nursing staff which still had increased slightly in the year before the introduction of the G-DRG system.

The considerable 5.2% annual increase in non-personnel costs can only partially be ascribed to the implementation of the G-DRG system. Some drivers of the above-average non-personnel cost increase (e. g. energy and fuel) are not related to the G-DRG system implementation. According to

the survey, hospitals named the expansion and the maintenance of information technology infrastructure as being caused by the G-DRG implementation. This could have led to an above-average increase of administrative requirements.

Survey results show that the investment ratio slightly dropped between 2004 and 2006, yet due to the introduction of the G-DRG system investments in IT-infrastructure and in (medical) technology were made. There seems to be a link between hospitals' investment activities and the introduction of the G-DRG system.

Because effects on economic efficiency of medical care resulting from the implementation of the G-DRG system can't be directly derived from available data, hospitals and relevant stakeholders were asked to assess these effects. Overall, respondents assessed that economic efficiency of inpatient care had increased in spite of additional costs, such as costs for data processing, medical cost control or administration, which arose from the implementation of the G-DRG system.

Since the implementation of the G-DRG system the number of reimbursement claims audited by the Medical Review Board has clearly increased. According to responding hospitals, the share of reviewed cases of all inpatient cases rose from 7% to 10%, and parallel to that the number of case-specific audits increased as well. The share of inpatient cases with revision of claims as well as the average revision amount remained constant throughout the period of observation.

The increase in the number of audits conducted by the Medical Review Board is accompanied with the rise in hospital staff involved in the audits. Similar developments could be monitored for health insurance funds. They recruited and continuously trained staff for these audits, especially between 2002 and 2004.

### **Shift of services**

In the first research cycle the analysis of possible service shifts from hospitals to other health care providers, respectively to other health care sectors, focused on shifts to inpatient rehabilitation, outpatient surgery in hospitals and statutory health insurance fund's expenditures for home health care. In the second research cycle the analysis will be extended to services of Statutory Health Insurance-accredited physicians after patients' hospital stay.

Between 2003 and 2006, inpatient rehabilitation services decreased (in terms of number of cases and inpatient days of care) and despite the reduction of the average length of stay in inpatient hospital care, the length of stay in inpatient rehabilitative care slightly dropped. This leads to the conclusion that no shift of medical services from inpatient care to rehabilitative care has taken place. Even though an increase in the share of patients trans-



ferred from inpatient hospital to inpatient rehabilitative care as a share of all patients admitted to rehabilitation establishments can be observed, a correlation of the increase can't be ascribed to the G-DRG implementation as this development turns out to be a long-range trend. The share of patients transferred from rehabilitative to inpatient care as a share of all patients discharged from rehabilitative care has increased between 2003 and 2006 and will be further monitored in the second research cycle. Based on the data available for the G-DRG impact evaluation, there seem to be no indications of medical service shifts from inpatient hospital care to inpatient rehabilitative care that can be ascribed to the G-DRG implementation and are associated with early discharges due to economic incentives.

The main impacts for the huge rise in the number of outpatient surgeries in hospitals since 2004 were most likely the changes of the contract and the catalogue according to sec. 115b Social Security Code No. 5 (outpatient surgery in hospitals) and the expanded audit options for inappropriate inpatient care for health insurance funds. The implementation of the G-DRG system and the resulting "product definition" for inpatient services may have supported the rise in outpatient surgeries in hospitals as well.

Between 2003 and 2006, expenditures for home health care according to sec. 37 para. 1 Social Security Code No. 5 (instead of or to avoid a hospital stay) slightly declined. This does not indicate any medical service shifts from inpatient care to this care sector.

### **Effects on quality of care**

One of the primary objectives of the G-DRG implementation was to maintain the quality of inpatient care despite the incentives for hospitals to lower levels of performance within a G-DRG that are inherent to the system. Between 2004 and 2006 both, process and performance quality of several service fields of inpatient care were part of the quality assurance process according to sec. 137 Social Security Code No. 5. During the observation period the majority of methodologically comparable quality indicators showed slightly improved or unchanged results. Some quality indicators show decreasing results (e. g. heart surgery); in the BQS-reports (National Institute for Quality in Health Care) this development is usually explained with reasons not attributable to the G-DRG system. The overall analysis of these quality indicators leads to the conclusion of a stable or improved quality (process and performance quality) in the inpatient sector throughout the introductory phase of the G-DRG system. This conclusion can only be drawn for the observed medical services and the aspects that are represented by this set of indicators.

By means of a systematic literature review effects of the G-DRG system on patient satisfaction were analyzed. The only published study on this topic

(WAMP) shows heterogeneous results, yet improvements of relevant parameters prevail.

Information on internal hospital structures and the process of quality management was collected by the hospital survey. Both, the number of staff engaged in quality management and the share of these employees of all employees in hospitals increased between 2003 and 2006. The use of structures and tools for quality management as well as the accreditation of hospitals in regard to quality management increased. The expansion of quality management structures and processes is, however, not primarily attributable to the G-DRG implementation, but rather to legal requirements (sec. 135a Social Security Code No. 5). Between 2004 and 2006, the introduction of clinical pathways has increasingly spread among hospitals as well. According to the hospital survey, the G-DRG implementation has been a deciding factor for this development.

Overall, the above described developments – regardless of the reasons for these changes – may have had a positive effect on the quality of care. A further assessment on the development of structural quality within hospitals (which could occur as changes of hospital capacities, department structures, staff and equipment structures) was not feasible with the data available from this evaluation.

Therefore hospitals and stakeholders were requested to evaluate the new reimbursement system's consequences on quality of care. The respondents assessed those consequences in varying ways. It was repeatedly stressed that process improvements were achieved due to the need to improve planning and organizational aspects of treatment within the G-DRG system. Yet, increased medical documentation requirements in connection with the decrease in the length of stay have resulted in a work-intensification at the expense of patient care. The increased quality management activities were rated positively, although these are mostly attributed to other legal requirements rather than to the G-DRG implementation. Some respondents stated that improved possibilities for benchmarking allowed a quality improvement for inpatient care, while always counteracting the potential risk of lowering quality of care due to the increased cost-pressure.

### **Effects on transparency**

Due to the need for standardized medical documentation within a fee per case reimbursement system a new, standardized and detailed data basis was created with the G-DRG implementation. Because of the G-DRG product definition this leads to a higher transparency in inpatient care for most stakeholders (hospitals, insurances, health insurance funds, the public, self-governing bodies and governmental bodies) than within the former reimbursement system. Regardless of additional (potential) possibilities to fur-

ther improve transparency, all legal requirements for data publication have been fulfilled. This includes publication of G-DRG data, G-DRG cost data and data on impact evaluation. Relevant information for stakeholders in terms of data on quality, costs and medical service provision is broadly available to the public. Information from different data origins is edited and published in a highly comprehensible way and provides significant and relevant information to all stakeholders. The continuous refinements of the G-DRG system themselves are transparent and traceable.

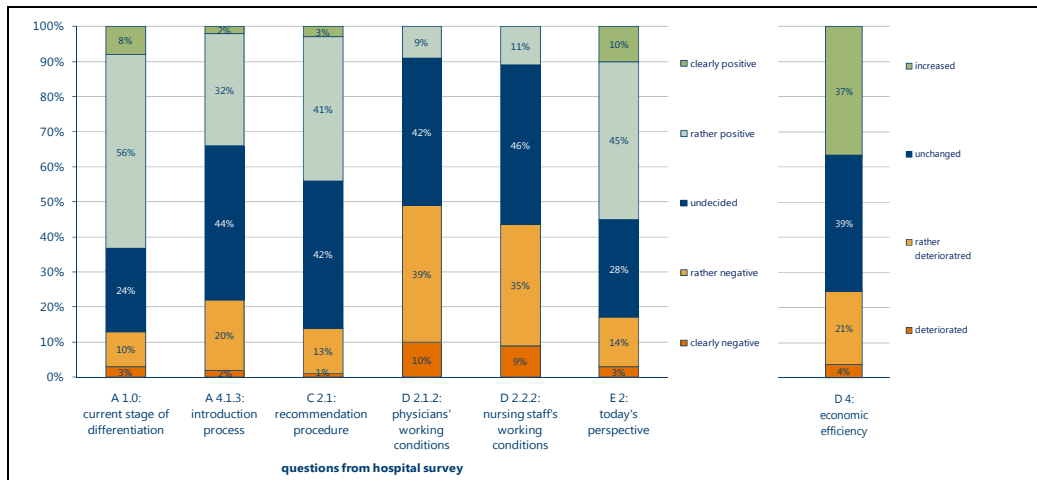
The introduction of the G-DRG system itself has led to an advanced transparency within the inpatient care sector. Since the implementation of the system this transparency has been increased and a continual aim should be further improvement of transparency.

### **Acceptance of the G-DRG system**

Overall, surveyed hospitals and stakeholders judge the G-DRG system introduction phase rather positively in terms of the further advancement of the system. In many cases respondents emphasize that the German Institute for the Hospital Remuneration System (InEK) and the self-governing bodies managed to carry out the system's introduction in a professional and traceable manner. Nevertheless, some respondents regard the possibilities to participate in the system's advancement process as being too complex, especially for small hospitals for basic and regular care. Stakeholders judge the G-DRG proposal process (recommendation procedure for integrating medical, scientific and other expertise via "structured dialogue") positively overall, the same goes for the process for introducing new examination and treatment methods (NUB) although some respondents regard the implementation of NUBs on a regional level as being in need of improvement.

The majority of respondents rate the current stage of development of the G-DRG system (2008) positively, both in terms of the achieved level of differentiation (only selective need for adjustments is mentioned) and in regard to invoicing conditions. In this context some respondents criticize the lack of manageability and suitability for daily use, and especially the differing interpretations between health insurance funds and hospitals, although it is also stated that this is implicit in the system's high level of complexity as well as in the conflict of interest.

Figure 2: Acceptance of the G-DRG system (extract from hospital survey)



Source: IGES; Hospital survey <sup>1</sup>

Budget and remuneration negotiations are described as being more transparent in terms of medical services and reimbursement equity, although this has led to an increased level of complexity and requires intensified preparation.

Surveyed hospitals and stakeholder assess the effects of the G-DRG system implementation on working conditions for physicians, nursing staff and other employee groups as explicitly negative, mostly due to the increased workload but also in terms of quality of work (e. g. congruence of tasks and skills, opportunities for professional development, scope of action).

<sup>1</sup> Questions: A 1.0: How would you assess the current stage of differentiation of the G-DRG system? A 4.1.3: Please assess the G-DRG introduction process in terms of the advancement of the classification's differentiation with a view to the self-governing bodies and the executing institutions. C 2.1: How would you judge the recommendation procedure for integrating medical, scientific and other expertise into the systems's advancement process? D 2.1.2: How would you assess the consequences of the G-DRG system on working conditions for physicians in terms of qualitative aspects (e.g. congruence of skills and tasks, opportunities for professional development, scope of action)? D 2.2.2: How would you assess the consequences of the G-DRG system on working conditions for nursing staff in terms of qualitative aspects (e.g. congruence of skills and tasks, opportunities for professional development, scope of action)? E 2: Regarding all aspects and consequences, how would you assess the G-DRG system from today's perspective? D 4: What influence did the G-DRG system introduction have on economic efficiency of German health care?

The majority of the respondents rate the G-DRG system and the implementation process, as well as the effects on economic efficiency positively. Negative side effects named are the intensification of workload for hospital employees as well as the increased economic focus on efficiency which results in a fundamental change of perspective in the inpatient care sector.

### **Prospects**

The results of the G-DRG impact evaluation, according to sec. 17b para. 8 Hospital Finance Act, indicate that during the introduction phase a development towards the aspired G-DRG objectives has been initiated. At the same time many of the potentially negative effects of flat-rate remuneration systems did not occur. Certainly, an improved transparency - that facilitated an intensive scientific discussion throughout the introduction process - and the design of the introduction process have contributed to this development to an important extent.

Nevertheless, the observation period is too short to evaluate the effects of the G-DRG system implementation in conclusion. Results of impact evaluation's second research cycle – based on a longer time frame – as well as latest developments in research will also need to be considered.