

G-DRG-Impact evaluation according to sec. 17b para. 8 Hospital Finance Act

Executive summary of the final report of the third
research cycle (2008 to 2010)

March 2013

Analysis by order of the German Institute for the Hospital Remunera-
tion System (InEK)

Torsten Fürstenberg

Mareike Laschat

Karsten Zich

Silvia Klein

Patrick Gierling

Hans-Dieter Nolting

Torsten Schmidt

IGES Institut GmbH

Friedrichstraße 180

10117 Berlin

www.iges.de

Introduction

In 2004, the [G-]DRG system ([German-] Diagnosis-Related Groups) was introduced as a new diagnosis and procedure related flat-rate remuneration system for almost all inpatient services in somatic hospitals in Germany. The G-DRG system has led to uniform “product-definitions” of inpatient services. Based on this, hospital budgets are ascertained prospectively, performance-based and individual case reimbursement levels are set. The introduction of the DRG system aimed at enhancing economic efficiency, competition, developing demand-based service structures, increasing transparency within the hospital sector and ensuring the quality of inpatient care. To further support quality assurance of inpatient services, external measures were implemented and expanded.

Such fundamental changes of incentive structures in the inpatient care sector may also lead to unintended effects and possibly even unwanted, unforeseen adjustment responses by the protagonists.

On introduction of the new reimbursement system, the legislator therefore commissioned the self-governing bodies (as per sec. 17b para. 8 Hospital Finance Act) to conduct subsidiary research on its effects. This impact evaluation was to focus on changes in (infra) structures and quality of care, as well as the effects on other care-sectors including type and extent of service shifts from one care sector to another.

The self-governing bodies for the inpatient hospital care sector (German Hospital Federation, National Association of Statutory Health Insurance Funds and the Association of German Private Health Care Insurers) thus designed and tendered a research project for impact evaluation as per sec. 17b para. 8 Hospital Finance Act, for which the IGES Institute was awarded the tender and commissioned to conduct its implementation in December 2008.

The results of the first G-DRG impact evaluation research cycle, published in April 2010, exclusively referred to the G-DRG system implementation phase from 2004 to 2006. The second research cycle examined the core convergence phase from 2006 to 2008. The current report on the third research cycle focusses on the end of the convergence phase from 2008 to 2010.

The subdivision into three research cycles allowed for adjustments to incorporate new research developments and latest findings. Thus, not all research questions from the first research cycle were readdressed in the subsequent research cycles, and new questions, e.g. regarding service shifts in the ambulatory (SHI-physician) care sector, impacts on post-discharge mortality and changes in referral patterns of the hospitals, were integrated into the investigations during the course of the research.

The impact evaluation draws from a broad empirical data base. This includes questionnaire surveys of all hospitals accredited under sec. 108 Social Security Code No. 5 and of all Medical Review Boards of the Statutory Health Insurance Funds. Furthermore, highly aggregated G-DRG data evaluations as per sec. 21 KHEntgG, hospital data collected by the Federal Office of Statistics, as well as data from the National Institute for Quality in Health Care (BQS) and the Institute for Applied Quality Improvement and Research in Health Care (AQUA) were provided. The current research report is supplemented with a user-friendly database downloadable from the InEK website which, in addition to the dataset for this research period, contains datasets from previous research cycles.

Additionally, substantial amounts of routine data from statutory health insurances, made available by health insurances and health insurance associations, were integrated into the impact evaluation. For reasons of data protection, this data has not been included in the data publication of the impact evaluation.

Due to the simultaneous and nationwide implementation of the system, the impact evaluation can only be based on data provided by hospitals that participated in the G-DRG system implementation phase. Therefore, changes over time can be described, but reliable conclusions about their causes cannot always be drawn due to lacking reference ranges. Furthermore, numerous developments in the inpatient sector occurring contemporaneously with the G-DRG system implementation might have influenced the parameters analysed in the impact evaluation. In many cases, a clear distinction between effects resulting solely from the G-DRG implementation and any other plausible influencing factors is also not possible. For methodological reasons, the impact evaluation can therefore often only describe actual changes, but cannot conclusively identify causal relationships between the implementation of the G-DRG system and specific changes within the inpatient care sector.

However, the impact evaluation does give a comprehensive picture of the inpatient care sector and its changes since G-DRG system implementation in 2004. It also broadly depicts adjustments induced by the G-DRG system during the course of the convergence phase, both in inpatient and bordering care sectors.

Effects on structure and medical services of the inpatient care sector

The trend of decreasing hospital numbers and hospital beds already observed prior to the implementation of the G-DRG system continued on a virtually identical scale between 2003 and 2010. However, the reduction of service capacities, particularly with regard to the number of hospital beds progressively decreased since G-DRG system implementation. Thus, the number of hospital

beds as well as the number of beds per 100,000 inhabitants only showed a slight decline at the end of the convergence phase. Already in the core convergence phase they had shown a weaker decline than in the implementation phase of the G-DRG system. The numbers of hospital departments showed very different developments in the various specialties. While ophthalmology, obstetrics and gynaecology as well as ENT departments declined since the 90ies and continued to decline even more strongly in number after G-DRG system implementation, other specialties like neurosurgery and neurology continued to show increasing department numbers as had already been observed before the remuneration system was changed. However, these changes cannot exclusively be ascribed to the G-DRG system implementation, particularly in view of the numerous influencing factors that take effect alongside the remuneration system.

In the hospital survey, many hospitals report further adjustments and reorganisation measures for their organisational structure also at the end of the convergence phase. As during the implementation and core convergence phase of the G-DRG system, these include the setup and further development of medical centres, expansion of the range of provided services, setup and extension of outpatient surgery and accompanying structures, establishment of intermediate care units and reorganisation measures of admission processes. Reasons for the above-mentioned measures are reported to be predominantly independent from the G-DRG system. According to the surveyed hospitals, the conducted adjustments connected to the G-DRG system implementation aim to enable more economic provision of services or a higher quality of care. To achieve these goals, institutionalised cooperative relationships with other hospitals were formed more frequently at the end of the convergence phase than during the implementation phase of the G-DRG system. Beyond this, particularly the incentives for more economic provision of services led hospitals to implement reorganisation measures for internal operational structures which focus, e.g. on the further development of interdisciplinary collaborations as well as the use of IT and controlling instruments.

The decline in the total number of full-time employees in the hospitals observed before the G-DRG system implementation did not continue or only progressed very marginally after implementation, although developments for the numbers of full-time employees and the employee workload derived from the number of cases and inpatient days of care differed throughout the professions. For physicians, the number of full-time employees increased more markedly after the introduction of the G-DRG system than before. The employee workload expressed in the number of cases per full-time employee showed a stronger decline between 2003 and 2010 than before G-DRG system implementation, while the number of inpatient days of care per full-time employee declined by the same amounts from 2003 to 2010 and from 1995 to 2003. For nursing care, however, the number of full-time employees showed a slower decline after G-DRG system implementation than previously, as the

increase in the number of full-time employees that had started during the core convergence phase further increased at the end of the convergence phase. While the employee workload in nursing care expressed as the number of cases per full-time employee increased as it already had prior to G-DRG system implementation, the number of inpatient days per full-time employee continued to decline. As the hospital workforce is influenced by other diverse factors (e. g. changes in inpatient treatment needs, statutory funding programmes and outsourcing), it is not possible to conclusively identify the impact of the G-DRG system on the development of full-time employee numbers.

Due to a lack of primary data, the possible influence of the G-DRG system on employee satisfaction was analysed by means of a systematic literature research. The results of the only study identified in the third research cycle showed an increasing proportion of nursing staff who are dissatisfied with their place of work between 1999 and 2010. To what extent this development represents an effect of the G-DRG system is, however, not investigated in this study. Work satisfaction has generally decreased in Germany since the 80ies, so that the increased dissatisfaction among nursing staff cannot be exclusively ascribed to the specific working conditions in hospitals or the effects of the new remuneration system.

One of the main objectives of the G-DRG implementation was to reduce the length of inpatient stays. In contrast to per diem remuneration systems, the G-DRG system gives clear incentives to do this. At the same time, a fee per case reimbursement system will also give misdirected incentive to increase the number of cases, which have been reduced by accompanying invoicing regulations in the G-DRG system.

The number of inpatient cases increased considerably with an annual average of 1.5% or 255,000 cases between 2008 and 2010. Immediately after G-DRG system implementation, it initially remained almost stable and then increased sharply from 2006 to 2008 with an annual average of 2.1%. Nevertheless, similar increases in case numbers have also been observed in other time periods, e.g. in the second half of the 90ies.

Before G-DRG implementation, the length of stay had already been in a steadily declining trend over the last years. This trend continued in slightly weaker form after G-DRG implementation. Between 2004 and 2010, the length of inpatient stay decreased from 7.77 to 6.82 days with an annual average of 2.2%. The reduction of the average length of stay between 2008 and 2010 is a largely homogenous development that extends to nearly all G-DRGs and main diagnoses, which was also observed between 2004 and 2006 and between 2006 and 2008. Additionally taking into account the long-term trend of decreasing length of stay and its continuous reduction in the entire period after G-DRG implementation, these homogenous changes do not speak for a high specific effect on the length of inpatient stay by the G-DRG system.

Both the number of cases and the case-mix showed considerable shifts in services also at the end of the convergence phase, particularly towards the G-DRGs of MDC 08 (Diseases and disorders of the musculoskeletal system and connective tissue), 05 (Diseases and disorders of the circulatory system) and the pre-MDC. Similar developments were already observed between 2004 and 2008. The most distinct case-mix increases were recorded for long-term ventilation, intervertebral disc surgery, defibrillator implantations, endoprosthetic knee surgery, as well as endovascular cardiac valve implantation. These are services that entail high non-personnel costs. Such changes in service structures also influence the hospital cost structures in that the proportion of non-personnel costs increases and personnel costs decrease.

A component analysis of the case-mix development at the end of the convergence phase showed that a large proportion (675,000 case-mix points) of the total case-mix growth of 954,000 case-mix points resulted from structural changes, particularly between adjacent DRGs within one partition, and also within adjacent DRGs as well as between the MDCs. 538,000 case-mix points can be attributed to the distinct increase in the number of cases. The decrease in length of inpatient stay, however, had a negative effect on the case-mix development, as was already the case from 2004 to 2006 and 2006 to 2008. While the case-mix increase during G-DRG system implementation phase was nearly exclusively based on structural shifts, the case-mix increase in the core convergence phase was already very strongly impacted by the number of cases. The component analysis for the time period between 2008 and 2010 points to very similar patterns underlying the case-mix development.

Despite the relatively short investigational period, it can be assumed that the above outlined developments in hospital services are also instigated by increasing prevalences of circulatory and musculoskeletal diseases resulting from changes in demographic development amongst other things. All in all, direct effects of the G-DRG system on the range of described changes in hospital services cannot be proven with the available aggregated database.

The results of the hospital survey show a continuing considerable increase in the proportion of hospitals that request new examination and treatment methods (NUB) as well as of hospitals that subsequently contract a NUB reimbursement at both the end of the convergence phase and during the core convergence phase. NUBs with high case numbers and a high number of hospitals providing the service are generally rapidly incorporated into the G-DRG system as supplementary remuneration.

Hospital transferral patterns only changed marginally between 2008 and 2010, as was already the case in the implementation phase of the G-DRG system and in the core convergence phase.

Further analyses on potential changes in hospital transferral patterns based on the actual transferral pathways of insureds were conducted in the third re-

search cycle of the G-DRG impact evaluation with routine data from the statutory health insurances. No systematic changes in hospital transferral patterns could be identified with this significantly refined database. Changes in numbers of transferral cases correspond to changes in service structures. All in all, based on the existing level of data aggregation no relevant changes in transferral patterns after the implementation of the G-DRG system can be observed.

A general specialisation of hospital services has not been observed in the entire period since G-DRG system implementation. However, an increase in the number of cases, particularly from 2005, is counteracting distinct specialisation. As a rule, expanding hospital service portfolios are accompanied by corresponding increases in case numbers, so that the average number of cases per hospital increased accordingly for the majority of G-DRGs. Distinct increases in the number of service providing hospitals can be seen between 2008 and 2010, as was also the case during the G-DRG system implementation and core convergence phase. This applies, for example, to G-DRGs for invasive therapeutic and diagnostic cardiac procedures as well as orthopaedic-surgical care for intervertebral disc damages. These increases are also related to the observed expansion in infrastructure for large medical devices in hospitals (such as heart catheterisation stations, magnetic resonance imaging machines amongst others). A systematic influence of G-DRG system implementation on the specialisation and diversification of hospital services could not be determined.

The average measured shortest (street) distance between the patient's residence and hospital (22.6 km in 2010) only changed slightly from 2004 to 2010. The same applies to the average shortest journey time (32.2 min in 2010). At the end of the convergence phase, the average distance only increased marginally, as had already been the case in the G-DRG implementation phase, which was followed by a slight increase in the core convergence phase. Regional variations in service provision structures and their respective changes could not be examined for the calculation of average journey distances and journey times. Regarding the access to inpatient services, different developments can be observed on the MDC level as well as for individual diagnoses. Changes in access to specific inpatient services are, however, strongly dependent on changes in the number of the respective specialised departments, existing care services, as well as changes in the number of cases (e.g. due to changes in population morbidity), so that the direct effect of the remuneration system on the changes in access to inpatient services cannot be deduced from this.

Effects on economic efficiency

The adjusted hospital costs did not increase as strongly since G-DRG implementation as they had between 1991 and 2003. The rise in costs, however,

accelerated over the course of time since G-DRG implementation. Nevertheless, the increase of the average costs per case was higher after G-DRG system implementation than between 1991 and 2003.

Since G-DRG system implementation, the personnel costs showed an overall increase at a rising rate as did the personnel costs per case, although these increased less strongly over the course of time. The proportion of personnel costs out of total gross hospital costs decreased considerably in this period of time as the increase in non-personnel costs between 2003 and 2010 ranged higher than the increase in personnel costs. The increase in non-personnel costs can particularly be ascribed to increases in medical supply costs which have also resulted from changes in the structure of medical services. The immediate impact of the G-DRG system on the developments in operating costs can, however, not be ascertained because numerous other co-determining factors (e.g. changes in numbers of full-time employees, adjustments in wage agreements, general changes in pricing, changes in the provision of medical services) are involved.

The revenue structures differentiated according to central hospital account groups only changed slightly from 2004 to 2010. Although the proportion of revenue from outpatient surgery increased slightly during this time, no overall diversification of hospital revenue sources can be observed.

The investment ratios obtained from the hospital survey generally remained stable between 2004 and 2010. Owing to the G-DRG system, a large proportion of hospitals continued to invest specifically in human resources and information technology infrastructure at the end of the convergence phase as well. This proportion, however, continuously decreased compared to the G-DRG system implementation phase.

The hospitals and Medical Review Boards of the Statutory Health Insurance Funds report an increasing number of Medical Review Board case audits for inpatient cases. Particularly in the G-DRG implementation phase, the proportion of reviewed cases out of all cases increased considerably, and still increased slightly at the end of the convergence phase (2010: proportion 11%). The proportion of reviewed cases with revision of claims increased steadily since 2006, but shows a slight decrease in 2010. The average claim amount with which the reviewed cases were corrected also increased steadily during this period of time. The overall increasing number of Medical Review Board case audits has led to rising personnel expenses in both Medical Review Boards and the hospitals. The surveyed hospitals report increasing numbers of hospital staff employed to prepare, accompany and follow-up Medical Review Board case audits.

Shift of services

Possible shifts in services resulting from incentives arising from the G-DRG system were investigated by examining developments in inpatient rehabilitation establishments amongst others. The number of cases in rehabilitation establishments as well as the number of inpatient days of care were subject to strong fluctuations both before and after G-DRG system implementation. The decline in average length of stay in inpatient rehabilitation since G-DRG system implementation does not indicate a shift of services from hospitals to rehabilitative care. This particularly applies to specialties with a high number of direct transfers from hospitals, as well as to the proportion of patients transferred from rehabilitation establishments to hospitals out of all patients between 2003 and 2010, which only fluctuated slightly. Due to changes in age structure (and the spectrum of diagnoses) of patients in rehabilitation establishments, a change in treatment complexity can also be expected. However, it cannot be ascertained whether or to what degree the G-DRG system implementation has led to a possible increase in treatment complexity in the rehabilitation sector.

Outpatient surgery in hospitals as per sec. 115b Social Security Code No. 5 has steadily gained increasing significance since the legislative adjustments in 2004. This is especially expressed by the increasing number of cases and large proportion of hospitals that perform outpatient surgery. After a sharp rise in 2004, the increase in the number of cases, however, weakened slightly from year to year during the course of the convergence phase. The results of the hospital survey show that the hospitals create the necessary prerequisites for a higher utilisation of this service sector by means of specific changes in their organisational structures. They expand, or want to expand, their full inpatient core business by establishing outpatient service structures and offers. Whether, and to what extent existing incentives from the G-DRG system have contributed to increasing case numbers in the outpatient surgery service sector can, however, not be ascertained.

Besides offering services as per sec. 115b Social Security Code No. 5, hospitals are also increasingly participating in other outpatient service sectors, for instance in pre-inpatient treatment as per sec. 115a Social Security Code No. 5 which does not include subsequent inpatient stay. According to the results of the hospital survey, the case numbers for this service sector increased considerably from 2006 to 2010, but showed slightly declining growth rates. Approximately 40% of the hospitals regard the G-DRG system as the prevailing reason for this development during both the core and end of the convergence phase.

The hospitals also report a continuous increase in numbers of cases in emergency units from 2006 to 2010. However, as had already been the case in the core convergence phase, only a small proportion of hospitals regard the

G-DRG system as pivotal for this development at the end of the convergence phase. The hospitals rather ascribe the increases in numbers of cases to restructuring measures in their emergency units, both in relation to spatial changes and reorganisation measures for internal operational structures. They also attribute the increases to a lack of resources in emergency care provided by statutory health insurance accredited physicians on both general practitioner and specialist care levels, as well as to regional restructuring of emergency care, e.g. through changes in the surrounding hospital infrastructure. However, emergency units in the hospitals will have continued to gain significance through the G-DRG system as it demands an economic provision of internal operational services. The units can be seen as an instrument for patient recruitment and binding on the one hand, and on the other prepare potentially necessary ward admissions and direct the patients onto the best course of treatment within the hospital.

Despite a slight increase in service expenditure in home health care according to sec. 37 para. 1 Social Security Code No. 5 (to avoid or shorten a hospital stay) between 2003 and 2010, a systematic shift of services in home care cannot be concluded, especially in the light of the overall very low case numbers and low expenditures.

Effects on quality of care

Changes in post-discharge mortality after G-DRG implementation were used as an indicator for performance quality and were investigated with very extensive routine SHI health data provided by health insurances and health insurance associations. Periods of inpatient stay from admission up to 30, 90 and 365 days post-discharge were investigated.

Overall, there has been a steady and marked decline in post-discharge mortality for the entire period after G-DRG system implementation (2004 to 2010). Both the periods from admission to 30 days post-discharge and to 90 as well as 365 days post-discharge show significant reductions in mortality ranging at 6.5% to 7.8%.

Whether and to what extent the observed decline in post-discharge mortality is influenced by the implementation of the G-DRG system can, however, not be quantified. Nevertheless, it can be ascertained that the implementation of the G-DRG system has not led to a systematic deterioration of quality of care in form of rising post-discharge mortality rates. These findings are consistent with international experiences with case-based remuneration system implementation, e.g. in the USA, although a comprehensive DRG system implementation which covers almost all hospital costs and nearly all somatic hospital cases as was done in Germany has been unique worldwide.

Besides using routine data, the development of indicators and measures of external quality assurance as per sec. 137 Social Security Code No. 5 was investigated for potential effects of the G-DRG system on the quality of inpatient service provision.

Overall, the performance quality indicators measured as per sec. 137 Social Security Code No. 5 which are comparable for the period between 2004 and 2010 demonstrate a clearly positive development. This is also confirmed when considering those performance quality indicators that could only be calculated comparatively for 2006 to 2010 and 2008 to 2010. Also, process indicators from external quality assurance procedures as per sec. 137 Social Security Code No. 5 which were included in the investigation and could be calculated on a comparable basis for 2004 to 2010, show consistent improvements of the overall results as well. A direct relationship between these developments and the implementation of the G-DRG system can, however, not be established. Nevertheless, the changes in the remuneration system have not led to a deterioration of the investigated parameters, as can be seen clearly in most of the observed findings. However, the indicators of external quality assurance as per sec. 137 Social Security Code No. 5 only allow for limited conclusions on the quality of care of the entire inpatient care sector and the potential effect of the G-DRG remuneration system. The main reason for this is that the procedure only includes selected (service) areas of hospital care and individual aspects of quality of care from within these only.

The systematic literature analysis, conducted to examine the changes in patient satisfaction did not yield any findings in the third research cycle. As there was a lack of published study results, unpublished survey results were used to obtain indications of whether the G-DRG system changed patient satisfaction with regard to both the inpatient stay and quality of care. Findings from these, however, only show very slight changes in patients' experiences. However, the findings also lack a reference to possible effects through the changed hospital financing. Nevertheless, the findings do not show any evidence of deterioration in patient satisfaction.

The continuous implementation and expansion of instruments and structures for quality management that were reported by the surveyed hospitals could be related to this context. Accordingly, prevalences of quality management representatives, quality system procedures and quality management handbooks have increased considerably since 2004. Particularly the implementation phase of the G-DRG system showed a sharp increase in the utilisation of these instruments, which also continued to increase in the convergence phase. The proportion of certified hospitals also grew considerably between 2004 and 2010, although the increase steadily declined over the course of time. The surveyed hospitals consider the hospitals' general quality policies and political requirements as per Social Security Code No. 5 to be responsible for the develop-

ment and expansion of their quality management and associated this much less with incentives arising from the DRG system.

Prospects

The findings of the G-DRG impact evaluation as per sec. 17b para. 8 Hospital Finance Act indicate that the G-DRG system has initiated manifold developments towards its aspired objectives since its implementation phase. The incentives resulting from the system, for instance for more economic provision of services or warranting a higher quality of care, have induced hospitals to implement diverse reorganisation measures. With the change of the remuneration system and its accompanying conditions and measures, inpatient services have also gained considerably higher economic transparency.

Although in many cases the direct impact of the G-DRG system on the investigated parameters of change in inpatient care cannot be ascertained, the findings of the G-DRG impact evaluation do clearly show that many of the feared negative effects of case-based remuneration systems, particularly with regard to a deterioration of quality of care, did not take effect.

The survey results from the first research cycle already showed that the system was broadly accepted by all participants. The observed developments and adjustments made by the hospitals and other stakeholders in response to the G-DRG system since its implementation have continued in multiple ways during the course of the convergence phase and at its end. Hence, it can be assumed that changes have possibly not yet been fully completed even after the end of the convergence phase. For this reason, the developments in inpatient care should continue to be observed in order to identify long-term changes and react to these accordingly.