

Performance of reimbursement schemes in valuation of technologies: The example of Magnetic Resonance Imaging

R. Blankart*, J. Schreyögg and R. Busse

Department of Health Care Management, Institute for Technology and Management, Faculty of Economics and Management, Berlin University of Technology, Secr. EB2, Strasse des 17 Juni 145, 10623 Berlin, Germany

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Abstract. Different reimbursement schemes for health care providers have been developed worldwide. They have evolved over time and have been influenced by politics, costs, patient needs and technological progress. Different methods in the valuation of technologies and their reflection in outpatient reimbursement schemes are analyzed. Using Magnetic Resonance Imaging (MRI) as an example, five different reimbursement schemes from four countries are compared according to defined performance criteria. Major differences in the structure and valuation of internationally used reimbursement schemes are presented; Prices for Neurocranium MRI scans vary from €98 to €462 and large discrepancies can even be found within the same country. There are politically driven reimbursement schemes like the German Gebührenordnung für 'Ärzte, while others such as the Swiss TARMED are primarily based on actual costs.

Keywords: Valuation, payment, technologies, Magnetic Resonance Imaging, reimbursement schemes

1. Introduction

Health care is a commodity differing from other economic commodities because allocation is determined by highly regulated markets. In all OECD countries health care is regulated for political, economic and social reasons. Furthermore, payment structures in OECD countries are often administratively set, thereby significantly impacting resource allocation and economic efficiency [25]. The price determination of a service in a regulated market is difficult and will at best represent an approximate value of “real” market prices or costs. Therefore many countries have implemented so called valuation schemes trying to value and reimburse provider services in a fair way. Some countries pay for health care in block contracts that cover all costs (mainly tax-based systems); other countries rely on elaborate, sophisticated schemes based on actual costs which assigns a value to each step in a physician’s treatment process (mainly used in social and private health insurance systems).

There is evidence that the provider reimbursement scheme used can create incentives for opportunistic provider behavior, e.g. ‘cream skimming’ [1], which leads to an inefficient allocation of resources or low quality service provision [15]. In addition, the design of a reimbursement scheme plays a major

*Corresponding author. E-mail: rudolf@blankart.net.

role in the technology adoption process [27]. Seemingly small details in a reimbursement scheme can have intended or unintended effects that slow down the adoption process of a given technology [14]. For inpatient care reimbursement in DRG systems (Diagnosis Related Groups) it is often the case that different consumption patterns are not adequately represented between complex and less complex cases, e.g. the utilization of certain technologies. This so called compression effect found in DRG systems has been recognized since DRGs were first introduced into Medicare in the USA [7,21]. Several empirical studies on this phenomenon have given other countries the chance to consider lessons learned when implementing their own DRG systems [28]. However, there are only very few comparative studies that examine the valuation of technologies in outpatient reimbursement schemes and evaluate different scheme designs.

The objectives of this paper are 1) to explore methods to evaluate technologies, using Magnetic Resonance Imaging as an example, and their reflection in outpatient reimbursement schemes in four countries and 2) to evaluate the performance of these schemes in a comparative perspective according to defined criteria. Four countries were chosen for the purpose of this comparison, mainly led by the accessibility of reliable information. The four countries chosen represent a broad range of different systems: the US Resource Based Relative Value Scale (RBRVS), the Swiss TAR MED system, the German EBM2000plus and GOÄ schemes, as well as the Israeli reimbursement scheme.

2. Valuation of technologies in four different countries

Although the utilization of medical technologies differs largely between countries, most industrialized countries maintain a certain technological standard that is offered to patients [8,16,20]. In spite of similar standards the approaches toward technology valuation and the resulting reimbursements differ largely between countries.

2.1. USA

The development of Medicaid/Medicare's RBRVS began in 1985 at Harvard University and was completed in 1988. After the enactment of the Omnibus Budget Reconciliation Act of 1989, Medicare switched to the RBRVS scheme in 1992. Since then the schedule was updated regularly by the American Medical Association (AMA) and the Centers for Medicare and Medicaid Services (CMS). While the AMA is responsible for the current procedure terminology codes, the CMS update the reimbursement rates. The CMS's switch to the RBRVS represented a significant shift from a payment method based on charges to one based on the cost of providing the service [13]. Now, most health insurance companies and other health insurance schemes pay for physicians' services based on the RBRVS scheme, although there is no compulsory reimbursement scheme in the US.

According to section 1848 of the Social Security Act "Payments for Physicians' Services", Medicare has to compensate physicians for their work with a national fee schedule based on national uniform Relative Value Units (RVU). A Relative Value Unit is a numeric weight assigned to a medical encounter or procedure that provides information on its relative resource use. RVUs were developed for:

- physicians' work, measuring the time, skill and intensity associated with the service provided
- practice expenses such as office rents and employees' wages
- malpractice expenses that reflect average insurance costs

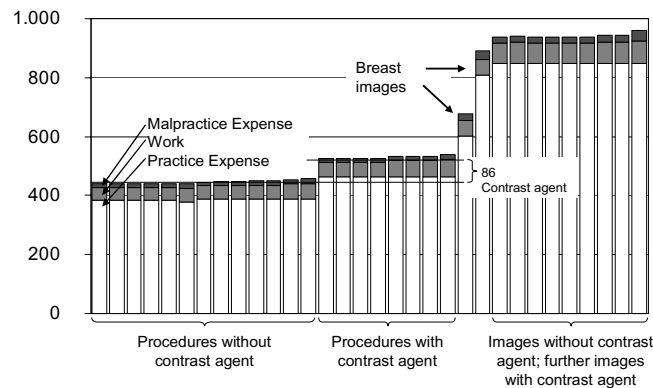


Fig. 1. MRI procedures grouped by reimbursements (RBRVS) [12].

The conversion factor of an RVU is adjusted each year by a sustainable growth rate (SGR). This rate, introduced in 1998, shall control the physician spending growth rate. The calculation is based on previous year spending adjusted by inflation, GDP growth and the numbers of beneficiaries in CMS-programs. Furthermore, changes in CMS law and regulations have an impact on the sustainable growth rate. Since 1998 the SGR has had a positive impact on the reimbursements until 2002, when the conversion factor was cut by five percent. From 2002 on the factor was slightly growing to US\$37.8975 (€31.9) per RVU in 2006 [9].

As a third factor, the Geographic Practice Cost Index (GPCI) is determined for each of the three RVUs to adjust for buying power in different geographical areas. The GPCI is different for the three types of effort considered; there is a GPCI each for the physicians' work, for the practice expense and the malpractice expenses [22].

The RBRVS attributes on average 52.5 percent of physicians' revenue to work and 47.5 percent to practice expenses, including a weighting of 3.9 percent of the total for malpractice expenses (forecast fourth quarter 2006) [23].

The scheme includes 32 different procedures for MRI procedures, including detailed information about staff involvement and technical equipment costs, but by grouping the various procedures it can be easily shown that there are only three major reimbursement levels with only marginal variations within the groups (Fig. 1). The RBRVS distinguishes between images without and with the use of a contrast agent and sequences starting without a contrast agent followed by images with the use of a contrast agent. Contrast agents are given orally or are injected to improve the identification of affected tissue. They are a major variable cost factor of MRI-scanning.

Regarding the differences between the reimbursements for images with and without a contrast agent, an average reimbursement of €86 can be inferred for the use of the injected contrast agent. Typical of most reimbursement structures, MRI breast images have different prices due to their increased complexity.

2.2. Switzerland

The Swiss TARMED scheme comprises about 4,600 total services with individual prices; this reimbursement scheme was introduced in 2004 and is based on an extensive economic study [17]. Reimbursements are split into basic and subsequent services. While basic services pay for the location, where a scan is carried out (outpatient (€67), inpatient (€85) and intensive care patients (€170)), subsequent services include the work of the physician (Ärztliche Leistung = AL) and expenditures for infrastructure

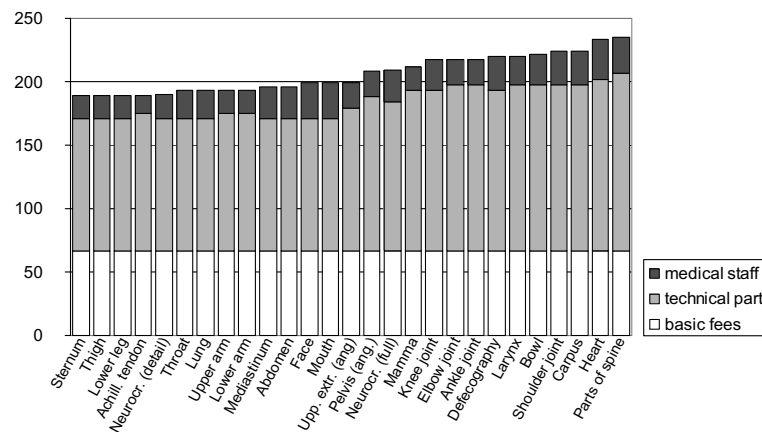


Fig. 2. Outpatient MRI procedures grouped by reimbursements (TARMED).

and medical and non medical staff (Technische Leistung = TL). For each of these attributes a different amount of fee points (Taxpunkte) are allocated. Therefore the fee points (TL and AL) for each procedure are attributed using several parameters. For the work of the physician the following must be determined:

- time needed for the service
- qualification of the physician
- medical assistance needed
- medical infrastructure needed
- anesthetic risk group
- complexity of the medical interpretation

To estimate the amount of fee points for the TL, services with similar prerequisites regarding non medical staff and qualification, infrastructure and the required floor space were evaluated in CHF per minute use [30]. The conversion factor is slightly different for each federal state (Kanton). These adjustments take into account the value of each service specific to each region's buying power, the level of provision and the bargaining power of the physicians in each region. The average fee point value is CHF0.89 (€0.56) [4]. The point-value is set by each Kanton in a political decision process which can certainly lead to a suboptimal allocation of resources. The TARMED catalogue lists 27 different MRI procedures with varying reimbursements. Figure 2 shows the procedures grouped by reimbursement.

2.3. Germany

In Germany two schemes coexist. For outpatient services the EBM2000plus is used in the statutory health insurance (SHI) system and the GOÄ is used for other patients (mainly the privately insured). As of January 2004 hospital inpatient care is compensated using DRGs for all patients regardless of their insurance type.

The EBM2000plus (Einheitlicher Bewertungsmaßstab – uniform value scale) scheme has been in use for the outpatient services sector since 2005; but there have been various predecessors. The current uniform value scale has evolved from the Swiss TARMED and similar to the EBM2000plus allocates points to each medical procedure and recognizes all accumulating costs such as:

- material costs

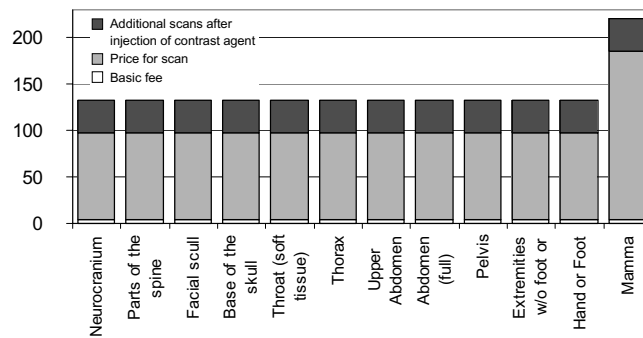


Fig. 3. MRI procedures grouped by reimbursements (EBM2000plus) [19].

- personnel costs
- rental and leasing of location and equipment
- energy costs, insurance premiums, costs of debt, training costs and other costs [17].

Similar to the SGR in the RBRVS scheme, the EBM2000plus point value is floating to control total physicians' spending. The main characteristic is the retrospective calculation of the conversion factor that causes uncertainty about the reimbursements for the physicians. At the end of each quarter, every physician invoices the physicians' association for the total number of service points delivered. The total budget that the regional physicians' associations receive from the sickness funds is divided by the total number of points to calculate the point value. Therefore the monetary value of each point cannot be predicted as it depends on the total number of points performed by all physicians in one region [6]. The monetary value is then used to calculate the physicians' remuneration. Since 2005 so-called Regular Service Volumes (Regelleistungsvolumina) have been introduced in Germany that allocate a limited number of points at a fixed point-value set by the so called Valuation Committee. Services above these historically determined limits are paid at a much lower floating point-value. The values vary among the states, specialities and sickness funds (e.g. in Berlin between €0.018559 and €0.049989 for a point within individual budget in the second quarter of 2005) [18].

The EBM2000plus does not incorporate the use of a geographic factor since the budgets are negotiated in all states separately. Because of the different allocation mechanisms and the different negotiated payments, reimbursements for the services differ slightly between regions and the quarters of the year.

The EBM2000plus contains 12 types of MRI scans, but in addition to breast scans there are only two further sub-categories. Scans without and with the use of contrast agents are reimbursed e.g. in Berlin at a flat fee of €98. For follow-up scans with the use of a contrast agent (after scans without contrast agent) an extra €35 can be charged while additional fees are not applicable. Figure 3 shows the reimbursement structure of the EBM2000plus in the second quarter of 2005 for the federal state of Berlin.

The *Gebührenordnung für Ärzte* (GOÄ) is used for the calculation of payment for privately paying or privately insured patients. The fee schedule is defined by the Ministry of Health and the structure was last changed in 1995; this reimbursement scheme is therefore subject to a political decision process. Because of the long decision intervals in a rapidly changing environment, the reimbursement scheme structure does not reflect shifts in cost structures due to technological progress.

The GOÄ is applicable in the primary and secondary care sectors and uses a point system, similar to the other schemes. Since 2002 the fixed conversion factor has been €0.0582873 per point [29]. To account for different physicians' skills, as well as case complexity, doctors are allowed to increase the standard rate to a maximum amount of 3.5 times the standard rate for most services; for medical technical

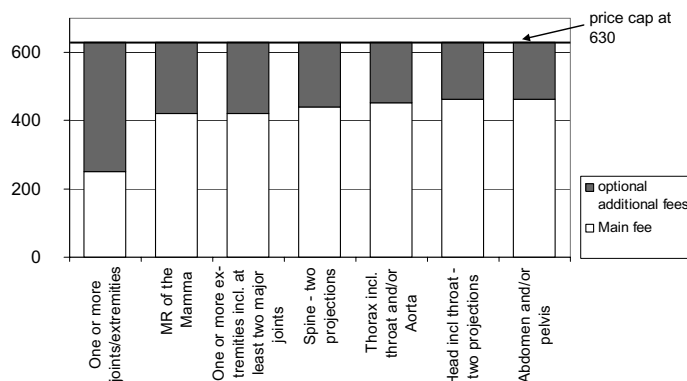


Fig. 4. MRI procedures grouped by reimbursements (GOÄ) [5].

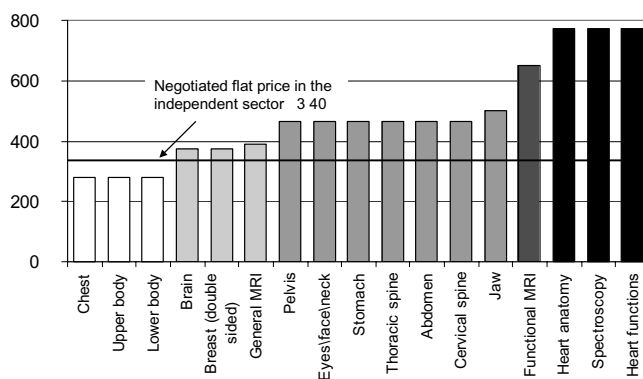


Fig. 5. MRI procedures grouped by reimbursements (Israel) [24].

procedures like an MRI scan, a maximum charge may also be applied, but the rate is only 1.8 times the standard value.

The GOÄ utilizes seven different reimbursement levels for MRI scans, in which only the examination of an extremity or joint has a significant deviation. On top of these payments additional services can be charged. For example a 3D-reconstruction or changing the patient’s position will accrue extra points, but for all MRI procedures in the GOÄ scheme a price cap (6,000 points) is in place. Additional fees for exceptional effort in case of very complex procedures can be added without affecting the point cap.

2.4. Israel

The Israeli health market features two further key players in addition to patients and providers. There is the National Insurance Institute that collects the health tax on behalf of the government and the sickness funds which contract with both governmental and non-governmental providers. Diagnostics are commissioned from hospitals that offer mostly inpatient services and so called independent sector providers who offer basically outpatient services. The sickness funds have high volume contracts with governmental hospitals that have governmentally set reimbursements and additional capacity is purchased by the independent sector at lower prices utilizing existing market competition.

The Israeli governmental reimbursement scheme covers 17 different MRI procedures which apply to governmental hospitals, but the sickness funds are not obliged to contract with the hospitals for all

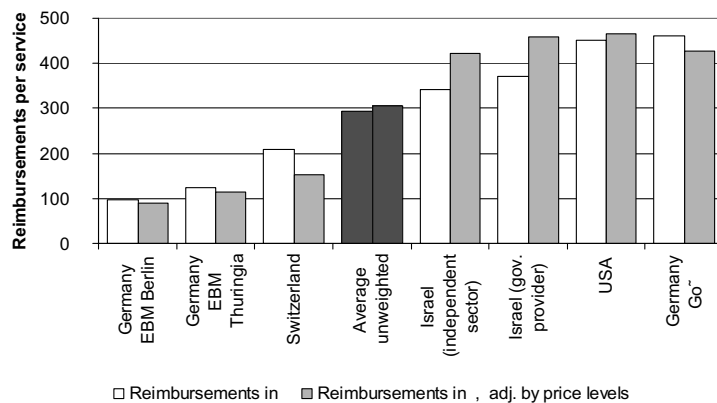


Fig. 6. Overview of reimbursement for a neurocranium image session in different countries – MRI.

procedures. Figure 5 illustrates the governmental and independent sector reimbursement schemes. The 17 different procedures can be segmented into four reimbursement groups. The inclusion or exclusion of contrast agents in the governmental reimbursement scheme is not consistently applied; there are procedures including the application of contrast agents and some procedures allow an additional fee (€360) to be added for the use of contrast agents. When contracting with an independent sector provider a single flat fee, including the contrast agent fee, is usually applied. The current reimbursements in the independent sector vary and are dependent on the contract type; they generally average €340 per episode of care.

3. Comparison of reimbursements for MRI neurocranium scans

In order to highlight the wide variations in pricing structures a neurocranium scan without contrast agents is chosen. Even within one country the comparison is difficult, because of the different historical backgrounds. For instance EBM2000plus reimbursements are changed regularly, while the GOÄ pricing system has stayed more or less static for more than a decade [2].

The following calculations reflect an MRI scan absent of any other fees that might be specific to the case history, such as diagnosis and examination of the patient, which is not directly related to the specific MRI diagnostic procedure. The reimbursements are based on the exchange rates of March 1st, 2006 and to level significant differences in purchasing power the prices are corrected using the OECD purchasing power parities ratio [26].

Figure 6 gives an overview of the costs for a neurocranium scan (including image and report). Looking at the uncorrected figures the lowest and the highest reimbursements are made in Germany. Whereas the EBM2000plus values the scan with €98, the GOÄ reimburses €462 for a neurocranium scan. Furthermore, the more extensive scope of services included in the lower priced EBM2000plus is noticeable. The EBM2000plus includes at least four images, whereas the RBRVS or the GOÄ include only two sequences and charge extra fees for additional images. The low reimbursements under the EBM2000plus are not an exception, e.g. certain outpatient gynecological surgeries are reimbursed up to four times higher by RBRVS or the TARMED [3].

As additional analysis, the reimbursements are compared after being corrected by the purchasing power parities (PPP). Reimbursements corrected by the PPP take differences in price-levels between countries into account. A significant impact can be seen in Switzerland (−36%) and in Israel (+23%).

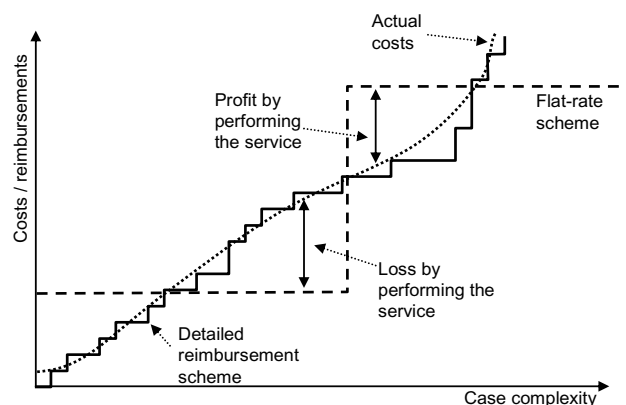


Fig. 7. Variation in costs, complexity, depending on case complexity.

4. Comparing the performance of reimbursement schemes

In this section the above presented schemes are compared according to defined performance attributes.

4.1. Unit system

With the exception of the Israeli reimbursement scheme all schemes use some kind of units or points which are ultimately converted into a monetary sum. The utilization of a point or unit system facilitates the comparability and the maintenance of the schemes. For example changing a single point-value in order to incorporate altered inflation rates requires much less effort than a recalculation of each scheme. If a change of reimbursements is necessary due to technological progress the points per procedure can be adjusted, which takes no more effort than adjusting individual reimbursements. Moreover, a unit system gives the reimbursement scheme more flexibility; e.g. certain structures like practice budgets or floating point-values can be easily introduced retrospectively. Furthermore, RVU-based schemes will allow standardization and benchmarking for inter- and intra-practice comparisons [10].

4.2. Flat-rate vs. detailed reimbursement scheme

Flat-rates are by definition not reflective of actual cost or complexity. Therefore a diagnostic provider makes a loss if the complexity and actual costs are higher than the flat-rate and makes a profit if the flat-rate is above the actual costs. To ensure a cost covering service a provider needs a certain mix of cases.

Detailed reimbursement schemes try to reflect complexity and actual costs and therefore a provider usually doesn't make large profits or losses by performing a service.

Figure 7 illustrates the differences between the two basic forms of reimbursement schemes. The X-axis shows the case complexity, which includes the medical procedure and the body parts imaged. The Y-axis shows the actual costs and varying reimbursements. The dotted line represents the actual costs, the solid line is an example of a detailed scheme and the dashed line is an example of a flat-rate scheme with two reimbursement levels.

Both schemes have advantages, the flat-rate scheme is easy to implement as well as transparent and the detailed scheme prevents 'cream skimming' and grants, therefore, the optimal service for the patient. On the other hand flat rate schemes can lead to 'cream skimming' by the providers by only performing the

profit making cases. Detailed schemes can produce high bureaucratic effort due to associated overhead costs such as staff time, IT systems and support, as well as other required resources that facilitate correct reimbursement scheme compliance.

Between both basic schemes a compromise has to be found, which on the one hand minimizes the risk of cream-skimming and on the other hand is not so overly complex as to hinder reimbursement scheme implementation and maintenance.

Cream-skimming is only profitable if the time and effort needed for its effective implementation is less than the derived profits. This means that a provider accepts a certain case mixture if the reimbursement scheme is not significantly lower than the actual costs. A certain equilibrium in reimbursement implementation and management can only be found using an iterative process; examples of this can be found in some cases of rebundling procedure codes in the US.

4.3. Geographical area

The RBRVS and the TARMED consider purchasing power in different geographical areas. The RBRVS does it in a fairly technical way with a formula considering several factors, whereas the TARMED adjusts for regional differences using more of a political decision process. The GOÄ does not take regional differences into consideration at all, and the EBM2000plus applies different point-values to different regions; they do not adjust for purchasing power parities, but rather for the average utilization of services in one region.

4.4. Freedom of contract

In most countries reimbursement schemes are the only applicable price list for medical services; e.g. in Germany physicians are not allowed to use reimbursement schemes other than GOÄ or EBM2000plus. More flexibility can be seen in Israel where sickness funds are allowed to contract directly with independent sector providers and utilize completely different schemes than those set by the government. This gives the sickness funds the flexibility to allocate their resources in an optimal way; they pay only marginal costs for the services from the independent sector provider due to the existing provider competition.

4.5. Cost containment

In some countries the reimbursement schemes have cost containment mechanisms implemented to control steadily increasing costs. The RBRVS utilizes the SGR and the EBM2000plus utilizes the floating point system to control medical expenditure.

4.6. Contrast agents

Contrast agents are one of the major expense factors in MRI scans and are critical in tumor detection. To minimize the risk of false negatives it is important not to give incentives that reduce the usage of contrast agents. Some schemes differentiate between the usage of contrast agents as a measure of a MRI scan's complexity. Only the EBM2000plus scheme and the Israeli on negotiation based scheme include the use of contrast agents in their respective reimbursements.

Contrast agents are one of the few costs which can be influenced in the short term by reducing the usage. Therefore the use of contrast agents should be reimbursed separately, to give incentives to use contrast

Table 1
Performance attributes of reimbursement schemes

	Performance attributes of the different reimbursement schemes					Performance attributes of scan	
	Unit system	Flat vs. detailed	Geogr. area	Freedom of contract	Cost containment mechanisms	Contrast agent	Location
RBRVS	yes	detailed	yes	partly	SGR	yes	no
TARMED	yes	det.	yes	no	–	yes	yes
EBM2000 plus	yes	flat	(yes)	no	Float. Points	partly	yes
GoÄ	yes	det.	no	no	–	yes	no
Israel	no	det./flat	no	yes	–	partly	yes

agents when appropriate. The increased usage of contrast agents in Israel is a counter-example. Although costs for the use of contrast agents are included in the Israeli independent sector reimbursements, which should implicate a lower use of contrast agents, there was a strong increase in MRI scans using contrast agents in recent years (approx. 50 percent of all scans performed used contrast agents).

Beside the differentiation of outpatient and inpatient treatment especially for capital intensive large scale diagnostic imaging (Magnetic Resonance Tomography, Computed Tomography or Positron Emission Tomography), a differentiation between mobile and fixed scanners could be useful to optimize allocation.

4.7. Location

The TARMED scheme differentiates explicitly between reimbursements for outpatients (patients going to diagnostic centers), inpatient scans and the increased efforts devoted to intensive care patients. In Germany, inpatient care is reimbursed with a completely different reimbursement scheme (DRGs) and in Israel hospitals are paid with the governmental set reimbursement, whereas the outpatient providers negotiate their reimbursements with the sickness funds.

Table 1 summarizes the performance attributes of the five different reimbursement schemes.

4.8. Conclusions

Reimbursement schemes have evolved over a long period and all countries have developed their own valuation instruments. For this reason the reimbursements for a similar service vary widely between countries. There is certainly no gold standard among reimbursement schemes and there is no evidence of the correct market price or the optimal reimbursement level. A reimbursement scheme always has to consider the historical structures of the health care system, as well as the cultural and political environment. However, MRI prices in Israel for the independent sector most likely reflect the actual costs most accurately, because it has the least political influence. Detailed reimbursement schemes like the TARMED seem to be the most equitable and transparent option, but maintaining the schemes, billing and controlling for the providers requires a large amount of resources. Recent developments in Israel and the US show tendencies toward flat fees [11]. Those fees do not require high bureaucratic effort, but can have negative implications on patient treatment if designed badly. In the case of MRIs, contrast agents should be reimbursed separately to avoid unintended incentives.

Although this paper focuses mainly on MRI scans, it provides a structure for performance evaluation of reimbursement schemes and draws certain general lessons that should be incorporated when redesigning existing schemes as part of health care reforms. Future research should tackle the issues raised in this article in an empirical way with individual level data. However, such data is currently not available for most countries.

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Conflict of interests

No conflict of interest declared.

References

- [1] H. Barnum, J. Kutzin and H. Saxenian, Incentives and provider payment methods, *International Journal of Health Planning and Management* **10** (1995), 23–45.
- [2] H. Berié, G. Braeseke, U. Fink et al., *Strukturen und Kostensteuerungsmechanismen im deutschen Gesundheitswesen unter besonderer Berücksichtigung der GKV*, Institut für Wirtschaft und Soziales (Hrsg.), Berlin, 2005.
- [3] J. Brökelmann, *Vergleich EBM2000plus mit den Gebührenordnungen RBRVS (USA) und TarMed (Schweiz)*, Bundesverband für Ambulantes Operieren (Hrsg.), BAO Depesche 11, Bonn, 2005.
- [4] Bundesamt für Gesundheit, *TARMED - Vorbereitung einer Wirkungsanalyse über die Einführung sowie die Wirkungen von TARMED*, Experten-/Forschungsberichte zur Kranken- und Unfallversicherung, www.bag.admin.ch/kv/forschung/d/2005/Tarmed_2005_d.pdf, accessed 23/01/2006.
- [5] Büro für Informationssysteme, *Gebührenordnung für Ärzte*, <http://www.e-bis.de/goae/defaultFrame.htm>, accessed 10/01/2006.
- [6] R. Busse and A. Riesberg, *Health Care in Transition Profile – Germany*, European Observatory on Health Systems and Policies, Copenhagen, 2004.
- [7] G.M. Carter and J.A. Rogowski, How recalibration method, pricing, and coding affect DRG weights, *Health Care Financing Review* **14** (1992), 83–96.
- [8] C.E. Dismuke, Underreporting of computed tomography and magnetic resonance imaging procedures in inpatient claims data, *Medical Care* **43** (2005), 713–717.
- [9] L. Dummit, *Updating Medicare's Physician Fees: The Sustainable Growth Rate Methodology*, National Health Policy Forum, Issue Brief 818, Washington DC, 2006, 1–16.
- [10] D.M. Dunning and T.A. Paivanas, Surviving the perfect Storm: An RVU-based Model to evaluate the continuing impact of MMA on the practice of oncology, *Journal of the National Comprehensive Cancer Network* **4** (2006), 3–15.
- [11] S.H. Fakhraei, Payments for physician services: an analysis of Maryland Medicaid reimbursement rates, *International Journal of Healthcare Technology and Management* **7** (2005), 129–142.
- [12] Federal Register – Department of Health and Human Services, *Centers for Medicare & Medicaid Services, Rules and Regulations* **70** (2005), 70116–70476.
- [13] J. Gregory and G.J. Przybylski, Understanding and applying a resource-based relative value system to your neurosurgical practice, *Neurosurgical Focus* **12** (2002).
- [14] G. Hackbarth and K. Milgate, Using quality incentives to drive physician adoption of health information technology. Medicare should help physicians overcome the barriers to adoption but should not simply pay the bill, *Health Affairs* **24** (2005), 1147–1149.
- [15] A.L. Hillman, Managing the physician: rules versus incentives, *Health Affairs* **10** (1991), 138–146.
- [16] R.C. Hutubessy, P. Hanvoravongchai and T.T. Edejer, Diffusion and utilization of magnetic resonance imaging in Asia, *International Journal of Technology Assessment in Health Care* **18** (2002), 690–704.
- [17] Kassenärztliche Bundesvereinigung, *Eine Investition in die Zukunft – Betriebswirtschaftliche Kalkulation: Wissen, was die Leistungen wert sind*, EBM2000plus, <http://daris.kbv.de/daris/link.asp?ID=1003745148>, accessed 24/06/2006.
- [18] Kassenärztliche Bundesvereinigung, *Einheitlicher Bewertungsmaßstab für ärztliche Leistungen*, <http://www.kbv.de/ebm2000plus/EBMGesamt.htm>, accessed 10/01/2006.
- [19] Kassenärztliche Vereinigung Berlin, *Auszahlungspunktwerte Quartal 2/2005*, <http://www.kvberlin.de/Homepage/aufgaben/punkt/index.html>, accessed 24/01/2006.
- [20] P.T. Kung, W.C. Tsai and C.L. Yaung, Determinants of computed tomography and magnetic resonance imaging utilization in Taiwan, *International Journal of Technology Assessment in Health Care* **21** (2005), 81–88.

- [21] J.R. Lave, Is compression occurring in DRG prices? *Inquiry* **22** (1985), 142–147.
- [22] Medicare Payment Advisory Commission, *Report to the congress*, Medicare Payment Policy, Washington D.C., 1999.
- [23] Medicare Payment Advisory Commission, *Report to the congress*, Medicare Payment Policy, Washington D.C., 2005.
- [24] Ministry of Health Israel, www.health.gov.il/taarifon/file_new/01012006/m010106.xls, accessed 27/02/2006.
- [25] J.P. Newhouse, *Pricing the Priceless: A Health Care Conundrum*, MIT Press, Cambridge, Massachusetts and London, England, 2002.
- [26] OECD, *New Comparison of GDP and consumption based on purchasing power parities for the year 2005*, Organisation for Economic Cooperation and Development, Paris, 2007.
- [27] M.S. Rauner and M.M. Schaffhauser-Linzatti, Interplay between inpatient reimbursement systems and healthcare technology management: the Austrian case, *International Journal of Healthcare Technology and Management* **3** (2001), 1–23.
- [28] J. Schreyögg, T. Stargardt, O. Tiemann et al., Methods to determine reimbursement rates for diagnosis related groups (DRG): a comparison of nine European countries, *Health Care Management Science* **9** (2006), 215–224.
- [29] Verband der privaten Krankenversicherung, *Einfachsatz*, <http://www.derprivatpatient.de/index.php?id=392>, accessed 09/02/2006.
- [30] A. Weissenburger, *Der neue Arztarief TARMED*, Bundesamt für Sozialversicherung (Hrsg.), *Soziale Sicherheit* **2** (2001), 61–62, Bern.