Robotic-assisted Surgery in Germany

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A recent overview on the basis of the encrypted OPS codes

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Since the introduction of the G-DRG-system in Germany, all in-patient cases are reimbursed via the DRG-system and are encrypted with OPS codes. Using publicly available data sources from the German Federal Statistical Office (DeStatis), the Federal Joint Committee (G-BA) and the Institute for Hospital Remuneration Systems (InEK), the authors analyze how robotic-assisted surgery (RAS) has developed in Germany in the period from 2006 to 2021. With over 60,000 robotic-assisted surgeries per year performed in more than 200 hospitals, robotic-assisted surgery has become a relevant and increasingly important part of surgical therapies in Germany.

Keywords: robotics, coding, strategy

Since the introduction of RAS in 1985 (Puma200, CASPAR, ROBODOC, which did not succeed), the breakthrough came with the ZEUS and AESOP systems, from which the Da Vinci system emerged. Initially used for heart surgery, this technology was increasingly used in urology, especially for radical prostatectomy (first description Prof. Binder 2001 in Frankfurt a.M.). In the meantime, it is also used in other fields (general surgery, gynaecology and others). In addition, other robotic assisting technologies are now established in numerous other indications in Germany.

With the introduction of the G-DRG system in Germany (2004) all patients treated as in-patient cases are reimbursed via case lump sums defined by service codes (e.g. ICD-10-GM and OPS codes). These are published with a time delay via various channels and are thus available for analysis. This study aims to provide an up-to-date overview of the development of robot-assisted surgery in Germany by counting encrypted OPS codes.

Data sources

Different OPS codes from group 5-987 are available for the analysis of robotic-assisted surgeries, depending on the data year and robotic technology. Until the end of 2015, only the OPS code 5-987 "Use of a surgical robot" was existing and could be coded. Over time, this OPS code has been differentiated so that additional and more specific OPS codes are now available for different robotic technologies.

From 2016, using the OPS-code 5-987.0, the application of a complex surgical robot (“Anwendung eines komplexen OP-Roboters”), (such as Da Vinci, Senhance, Hugo, etc.) can be specifically coded. The use of other robotic surgical systems was then coded with the unspecific OPS-code 5-987.x. This was subsequently further differentiated so that, starting in 2018, surgeries using a robotic arm (with at least six degrees of freedom) are coded with the OPS-code 5-987.1 and the use of a miniature robot with OPS-code 5-987.2 since 2021.

The “complex surgical robot” is used in particular in urology and general surgery specialties. Operations in the fields of orthopedics and neurosurgery are typically performed with a robotic arm (5-987.1, e.g. Rosa, Mako, ExcelsiusGPS, etc.).

All OPS codes for RAS are only used as supplemental codes in addition to the primary procedure to describe the technology used. Accordingly, however, in contrast to the primary codes for open or laparoscopic therapies, no information is included on the indication or the operation performed itself. Furthermore, using a supplemental code from the OPS code group 5-987 has no grouping effect in the DRG-system and therefore no reimbursement relevance. This means that coding RAS services probably does not have the same coding quality as coding reimbursement-related primary service identifiers. Nevertheless, in the context of an overall reliable and audited coding of in-patient services, the various supplemental codes for RAS appear suitable to describe the market for robotic-assisted surgery in Germany from 2006 onwards by analysing the publicly available data (DeStatis, InEK and J-FC).

The data source available for the analysis is, on the one hand, the "Diagnosis-Related Hospital Statistics (DRG Statistics) Operations and Procedures of Fully Inpatients in Hospitals up to the codable Endpoint" (DeStatis) for the years 2006 to 2021. In addition, the data from the "InEK Data Browser" for 2022, collected during the year, can be used.

Furthermore, service data from the quality data source of the Federal Joint Committee (J-FC) are available until 2021, which can also be used to show the services of each hospital.

Data evaluation

The results indicate that, starting from approximately 1,000 coded RAS procedures per year in Germany in 2006, more than 60,000 robotic-assisted surgeries have already been performed and coded in 2022.

In the first few years, compared to the previous year, growth rates of almost 50-60% were observed (▶Fig. 1). A stagnation in growth from 2012 to 2013 (8,590 cases in 2012 and 8,556 cases in 2013) was followed by renewed growth of 15% and average growth per year of about 26% (16%-30%).

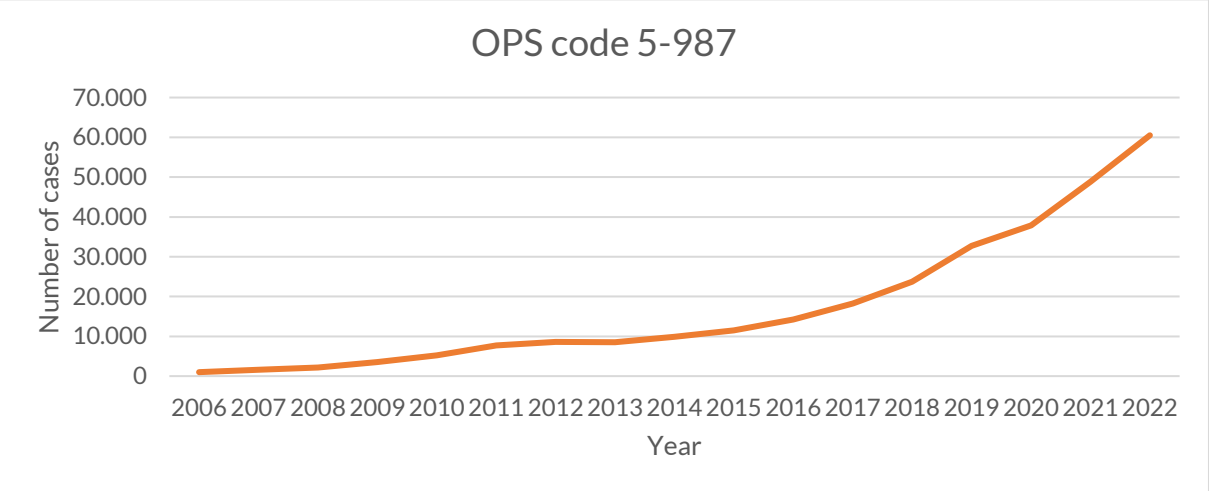

Figure 1: Number of coded OPS codes from group 5-987 for RAS ((DeStatis/InEK)

"With the introduction of the G-DRG system in Germany (2004), in-patient treatment cases are reimbursed via case lump sums, which are defined by service identifiers (e.g., ICD-10-GM and OPS codes)."

The evaluation shows that RAS services are dominated by operations using a complex surgical robot (▶ Fig. 2). If one examines the number of coded cases per department in the quality data of the J-FC in the period from 2016 to 2021, then, analogous to the international literature, most RAS cases can be assigned to the specialty of urology (▶Fig. 3).

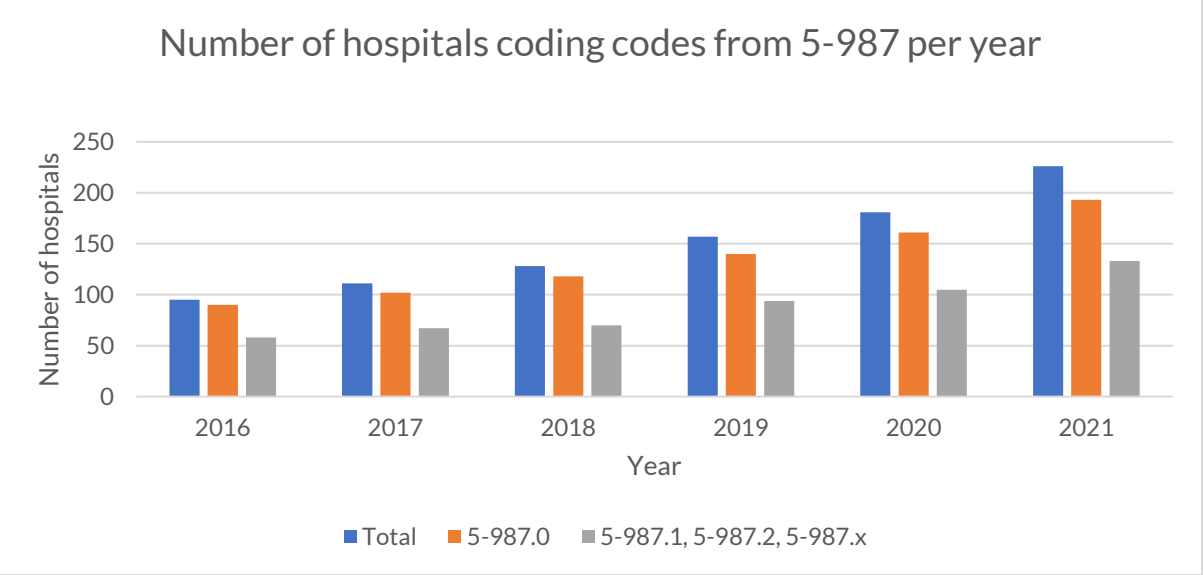

Figure 1: Number of hospitals with an OPS code for RAS (J-FC)

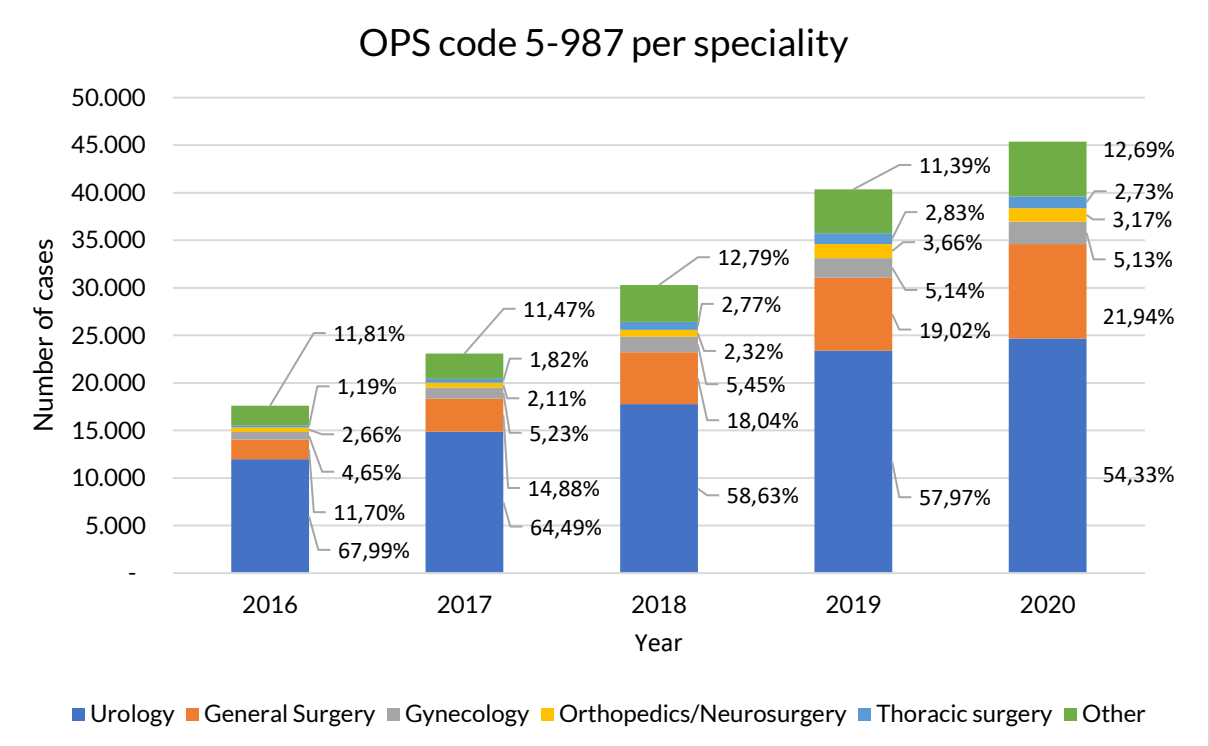

Figure 2: Distribution of coded OPS codes for RAS by specialty (J-FC)

According to the literature, these are radical prostatectomies for prostate cancer. However, this cannot be verified based on the available data, since the available data do not contain a correlation between the supplemental code for RAS and the primary code for the procedure.

"This and the growing case numbers overall can be taken as an indication that the advantages described in the literature of less invasiveness combined with higher precision, reproducibility, and standardization, expressed in the reduction of pain, complications, and blood loss and, in the end, in the form of faster convalescence and better process quality, also are true in the routine of care apply. "

With more than 60% of all RAS cases in 2016, the proportion in urology is reduced to 48% by 2021, although the number of cases in urology is more than double in the same period. With a much more significant proportion of gynaecological robotically assisted surgeries, this trend is far greater in an international comparison. The main reason is the faster growth in general surgery and other disciplines (▶ Fig. 3).

Assuming that every hospital that is coding an OPS code for RAS from 5-987 has at least one robotic surgical system, the number of hospitals with such a system has been increasing by approximately 19% (15%-25%) yearly since 2016 to 226 hospitals in 2021 (including 193 with a complex surgical robot, some hospitals with different robotic surgical systems) (▶Fig. 2).

Evaluation and outlook

The data of the J-FC allow statements on the (discharging) speciality, but it is not clear from the supplemental codes for which procedure the RAS technology was used. Whether, for example, the prostate or the kidney was operated on robotically assisted in urology cannot be analysed currently without case-related data. It is therefore desirable to redesign the OPS classification so that not only the technologies, but also the procedures - laparoscopic, open or robotic - can be clearly identified via the OPS codes (i.e., not as supplemental codes, but as primary codes).

The international literature confirms that RAS technology has significantly progressed in the last 20 years. This can similarly be illustrated by the case numbers in Germany. The data suggest that a large proportion of hospitals using RAS technology is using multiple robotic technologies. This is particularly remarkable considering the massive investment backlog in German hospitals.

This and the growing number of cases overall can be taken as an indication that the advantages described in the literature of less invasiveness combined with greater precision, reproducibility and standardization, which are expressed in the reduction of pain, complications and blood loss and ultimately in the form of faster convalescence and better process quality, also apply in the routine provision of care. With this in mind, the question arises as to how the investments for RAS technology can be reliably financed in the future and to guarantee access to these advantages in Germany for patients.

Robotic-assisted surgery is a technology that is also changing the care situation in Germany with its increasing application. In this respect, numerous relevant questions should be investigated. These include, for example, the question of whether robotic-assisted surgery is the standard of care for some indications, where Germany stands in an international comparison, and whether the formation of centres described by robotic-assisted surgery influences the quality of outcomes. The influence of technological advancements (e.g., virtual reality, interoperability, artificial intelligence) on RAS technology and thus, on care in Germany also promises to be an exciting development in the future. Further investigations, specification of OPS codes, establishment of care registers for structured data collection and differentiated analysis of methods and technologies are necessary.

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