Our work on Inpatient Quality Indicators

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Aim

Improvement needs measurement first. Outcome which cannot be measured cannot be improved. Our work on the German Inpatient Quality Indicators (G-IQI) is dedicated to facilitating the measurement of medical outcome for inpatient treatment using readily available administrative data, thus avoiding additional workload for physicians and/or other members of medical staff. The use of available data is possible as the introduction of DRG based payment systems has created a wealth of medical data in the administrative computer systems (so called ‘administrative data’ or sometimes ‘routine data’), which may not only be used for payment but also for other purposes. Our publications (see topic “Publikationen” on this site) contain many references to the scientific literature in this field.

The development of reliable measurement methods is also a prerequisite for the further development of payment methods in medicine. If we do not only want to pay for output (as with DRGs for example), but also for outcome or value, we need the corresponding indicators to measure outcome. Such indicators must be comprehensive, reliable, medically meaningful, suitable for automated algorithmic measurement and resistant against manipulation as far as possible. They should measure outcome, which really matters for the patient and thus also is important for the physician.

History

Our work on indicators dates back to the year 2000 when the first Annual Medical Report for 1999 was published by the HELIOS Kliniken Group. It contained in-hospital mortality rates for many diagnoses and procedures, which was a novelty at that time in the German hospital market. From these beginnings the version 1.x of our indicator system developed, which can be seen in the subsequent reports of that hospital group (see for example the HELIOS Annual Medical Report 2001). The indicators were independently developed. However they show some similarities to many of the AHRQ Inpatient Quality Indicators and to some of the AHRQ Patient Safety Indicators. This is a result of common medical understanding. Asking physicians for quality measures anywhere in the developed countries will sooner or later lead to numbers as for example acute myocardial infarction (AMI) mortality rates. Stroke, pneumonia, colorectal resections, aortic procedures, nephrectomy, joint replacement and other important diagnoses and procedures will easily be part of such activities in any country. These indicators could also be applied to the so called emerging market economies as such diseases and/or procedures are common there too. However their relative share with respect to all inpatient treatments is lower due to a much younger population which leads to shifts in the distribution of inpatient cases and their relative importance. Currently in those countries obstetrics or trauma care will be of relatively higher and for example stroke vice versa of lower importance than in most developed nations. However due to aging of the societies and the high prevalence of diabetes in some of those countries the focus will soon shift.

In 2005 we undertook a major revision of our indicator system which led to version 2. It was first published in 2006 in the HELIOS Annual Medical Report for 2005. A full definition manual for G-IQI version 2.5 was published in 2009. This version covered more diseases and procedures and further detailed the indicator system. In March 2011 we published the new version 3.1 of the German Inpatient Quality Indicators. This largely revised version covered new areas like heart surgery, thoracic surgery, procedures on the peripheral arteries and others.
Existing indicators had also been revised and supplemented by more details and differentiation. It also incorporated a lot of Swiss and Austrian proposals for the improvement of the indicator system. In 2012 we applied our indicators to the official German inpatient database and determined federal reference values for all indicators based on the over 17 million German inpatient cases (for data year 2010). The results were published in Deutsche Medizinische Wochenschrift. The combination of the indicator definitions of G-IQI Version 3.1 with German reference values 2010 was referred to as Version 3.2.

After that there were regular updates. Version 4.0 was first published in 2013 and included federal reference values of 2011. Version 4.1 was published in 2015 with federal reference values of 2013. Version 5.0, published in 2016, compares to federal reference values of 2014.

The latest version is 5.1 for the data year 2017. The federal reference values are now based on the national database of 2015, the latest available data year.

The following table shows the different versions and links to the respective definition manuals:

<table>
<thead>
<tr>
<th>Version</th>
<th>for data year</th>
<th>publication</th>
<th>Used national reference values</th>
<th>coverage</th>
<th>Link</th>
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Administrative dataset in Germany (so called DRG data)

G-IQI uses the standardized national dataset which originates from the G-DRG billing process. In Germany DRGs are used as an All-Patient / All-Payer system. This means, that almost all patients in all hospitals (except in psychiatry and psychosomatics) and from all insurance types are billed by the DRG system. By law there is an obligatory electronic billing process (§301 SGB V). All data which are needed for DRG billing are electronically transmitted to the insurance companies. Furthermore, once per year hospitals by law have to deliver all case data to the DRG institute (InEK). From there a data subset is transferred to the Federal Office of Statistics, where it is available for scientific evaluations.

As there are almost no exceptions, the national DRG database can be seen as a complete national database of all somatic inpatient cases. Due to the electronic data exchange the same basic data set is available in hospitals, insurance companies and the federal offices. Like the DRG system, the G-IQI grouper can easily be applied at all these levels.

The DRG data do not only contain the DRG, but also diagnoses, procedures, discharge status, demographic data and other informations needed for the DRG billing. G-IQI does not use the DRGs for defining indicators, but the related information about diagnoses and procedures. Thus G-IQI is based on the same data like G-DRG but both
systems use a different grouping logic. G-DRGs aim to form economically homogeneous groups for payment, whereas G-IQI aim to form medically homogeneous groups for quality control.

The following scheme illustrates the two approaches:

**Coverage**

The scope or coverage of quality indicators cannot be judged by the number of indicators because this would not tell much about the cases covered. Therefore we determine the number of cases which are included in the indicators measured. As some patients with multiple treatments may show up in different indicators (for example myocardial infarction may not only be represented in the AMI indicators but also in the mechanical ventilation indicators) such counts must be corrected for double-counting.

After exclusion of multiple countings G-IQI 5.1 covers 50.5% of all 18.6 Million inpatient of all German cases of 2015. 58.6% of all inpatient deaths are contained in the mortality indicators of G-IQI 5.1. The fact that the share of deaths is higher than the share in case numbers shows that G-IQI has a focus on more complex cases although many low risk procedures are also included. This bias towards more complex medicine is intended as we expect a higher potential for improvement in this area.

G-IQI does not show mortality rates for endstage or palliative care patients as we do not consider mortality as a quality indicator for such disease stages. Indeed the 50.5% of all cases, which are covered by all G-IQI volume indicators, would contain 75.3% of all inpatient deaths. However, as mortality indicators are not given for all covered diseases, only 58.6% of the inpatient deaths are effectively contained in the explicitly defined mortality indicators.

An overview of all disease groups and procedures covered by G-IQI can be found in the appendix table (Anhang 1) in the definition manual.

With respect to disease and procedure specific indicator systems we suppose that G-IQI currently provides the most extensive approach for a disease/procedure oriented quality measurement.
International use

Our G-IQI indicators gained interest in other countries. In 2008 the Swiss Ministry of Health (Bundesamt für Gesundheit – BAG) published a report for some of the Swiss hospitals using an adopted version based on G-IQI V 2.x. In 2009 a second report based on the data of 2007 followed. It contained the results of almost half of the Swiss hospitals, which voluntarily participated. In 2011 we adopted the new version G-IQI 3.1 to the Swiss coding system incorporating many proposals made by Swiss experts. This led to the Swiss version CH-IQI 3.1. Based on this system Switzerland introduced an obligatory public reporting of the CH-IQI 3.1 indicators for all Swiss hospitals.

Current results and further information can be found on the website of the BAG (Bundesamt für Gesundheit – Qualitätsindikatoren der Scheizer Akutspitäler). Currently Switzerland uses version 4.2 of the indicators. The latest national report for all hospitals refers to the data year 2015.

In 2009 our indicator system was also adopted to the Austrian coding system. In 2010 this led to version 1.0 of the Austrian Inpatient Quality Indicators (A-IQI). In April 2011 the Austrian Ministry of Health decided to use this system as a future basis for measuring inpatient quality on a national level.

In November 2013 the Austrian Ministry of Health published the first national quality report based on A-IQI. These reports have been updated. The latest versions and many further details can be found here.

The G-IQI indicators are used by a large group of German hospitals, which publish their results based on this system. It is the Initiative Qualitätsmedizin (IQ²). They use the same definitions as G-IQI, but in some cases with modified goals. Many other German hospitals use software, which can calculate G-IQI from administrative data. It is estimated, that more than 1000 out of about 1500 German non-psychiatric acute care hospitals use G-IQI.

It has to be mentioned that the involved authors tried to keep the German, Swiss and Austrian version as comparable as possible. However due to the different coding systems used in the different countries not all indicators can be fully comparable. Furthermore the indicator sets contain some national modifications. A cross-national comparison of the results therefore requires adequate precautions in the interpretation and knowledge of the corresponding definitions.

Use and application of G-IQI

Besides for public reporting G-IQI is used for improving outcome within a hospital’s quality management. G-IQI indicators are especially suited for monitoring the overall process performance for a disease or procedure. An increased myocardial infarction mortality in one hospital may indicate problems in one or more of the underlying treatment processes. In order to find out, if and which problems there might be, G-IQI is usually combined with peer review procedures based on patient records. The whole approach has been described in many of our publications as well as in publications of the various user groups (see our publication list and for example publications of Initiative Qualitätsmedizin and others).

See for example:

We have been able to show, that such an approach can help hospitals which were performing subpar in the beginning to improve their outcome considerably (see Nimptsch and Mansky, Health Affairs 2013).

We are also using the diseases and/or procedures defined in G-IQI for the analysis of health services in Germany on a national level with respect to the development of volumes, treatment methods and outcome. For this purpose we use the national data base of DRG inpatient cases. Germany has implemented a complete all patient / all payer DRG-system (with the exception of psychiatry) in 2003/2004. Hospitals have to deliver all DRG data to the Federal Office of Statistics. Thus beginning from 2005 a complete database of inpatient cases is available for scientific analysis. We used these data to analyze the development of different health services in Germany, as for example:


Reliable quality indicators also are a prerequisite for future inclusions of outcome aspects in medical payment systems as for example described by Michael Porter and many others. In our group we are investigating the criteria which have to be fulfilled in order to establish such systems. A catalogue of criteria with respect to medical as well as economic requirements has been published by Doerte Seeger.

Conclusion

G-IQI 5.1 currently is one of the most advanced quality indicator systems, which can rapidly be applied to administrative data. In Germany the indicators cover more than 50% of all 18.6 million inpatient cases.

• Scriba, PC, Nimptsch, U, Mansky, T (2013) The German Experience with Indicator-Based Quality Improvement. download PDF (use password 312022 for access)
respect to the in-hospital mortality the system provides disease specific mortality indicators covering 58% of all inpatient deaths.

These numbers indicate, that the indicators predominantly address severe diseases and/or procedures, where quality improvements can have considerable influence on mortality and thereby outcome. Intentionally, known end-stage diseases are not part of the indicators. Our goal is to address potentially avoidable fatalities by identifying weaknesses in the treatment processes for subsequent improvement. It is not intended to interfere with end stage care.

G-IQI is successfully used as a trigger system to identify possible weaknesses in the inpatient treatment processes and correspondingly target improvement activities. This usually also includes public reporting of the indicators at the hospital level. Furthermore we use G-IQI definitions on the national level for studying various aspects of certain diseases and/or procedures in health systems research.