



**Macroeconomics**

Giuseppe BURGIO

**STATISTICAL INDICATORS  
FOR HEALTH QUALITY MANAGEMENT**

**Abstract**

Measuring the performance of healthcare systems is of paramount importance for optimisation of health spending, as well as for elimination of deficiencies in the quality of care. Different statistical methods and measures of effectiveness, efficiency, responsiveness and equity of this performance are available.

Several performance indicators may be used, depending on the specific field of application and on the behaviour to be changed – of providers, professional bodies, citizens, or managers.

This paper provides for a critical analysis of the currently used statistical techniques and indicators, in particular those aiming at measuring hospital performance for better health quality management.

**Key words:**

Healthcare, indicators, management, performance, quality.

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Burgio Giuseppe, Director of the Research Centre in European and International Studies «EuroSapienza» of the Sapienza University of Rome, Italy.

## 1. Measuring Performance in Healthcare

Developed countries spend a large proportion of GDP on healthcare because of the patients' increasing expectations and ageing. Management of resources – called to guarantee high quality of health services and a sustainable cost-efficiency rate – requires continuous monitoring of the quality of services offered and use of the performance measures.

Such measures should be based on the appropriate statistical methods that are most adequate to measure the different aspects of the quality of health. In fact, performance may be defined [12] in relation to explicit goals reflecting the values of various stakeholders (such as patients, professions, insurers, and regulators). Measurements should also imply objective assessment, even if it they do not include judgement of the values of quality, which may be added by those who interpret the data.

Performance indicators are employed for four basic functions [4]:

- facilitating accountability;
- monitoring healthcare system and services as a regulatory responsibility;
- modifying the behaviour of professionals and organisations at both macro (population) and micro (patient) level;
- and forming policy initiatives.

The OECD countries, all of which produce and make use of performance indicators, apply three models (sometimes in combination) of accountability in healthcare:

- professional (managerial), delegating the responsibility of quality control to physicians;
- economic, based on the idea that competitive market may enforce accountability;
- political, viewing the citizens as receiving a public good and the government acting in his favour.

Very often the quality, even if it is high, may be perceived as poor. In fact, it may happen that the quality perceived by the patients as low is just when the health management believes the quality of services offered is high, – a consideration relating to increased efficiency in result of reduced costs and increased productivity, but without consideration for the social dimension of quality in health care in terms of accessibility and equity of health services.

The World Health Organisation (WHO) has recommended [6] to evaluate customer satisfaction with more «responsiveness», trying to take into account, as far as possible, the patient's needs in:

- autonomy (involvement in the choice of treatment, with provided information on alternative treatments);
- possibility of choosing the physician;
- communication (clear information and clear answers to questions of the patient);
- confidentiality of the patient's data and dignity (courtesy and respect for bodily privacy);
- readiness in the access to care;
- environmental comfort, including easy access of the patient's family members and friends.

In general, quality in health care must be considered as a process aiming at [5]:

- building up a monitoring system able to find opportunities of improvement, based on evaluation projects, and to quickly intervene in case of need;
- implementing organisational procedures to reduce wastes and delays;
- approving guidelines based on scientific evidence and monitoring their correct implementation;
- updating periodically the guidelines and procedures on the basis of new technological innovations and scientific results.

## **2. The Statistical Indicators of Health Quality Management**

Statistical indicators are intended to measure the specific phenomenon of which we would like to synthesise the behaviour.

Therefore, depending on the accepted definition, indicators for the same issue may be different. In any case, the indicators should enable finding the ways to improve performance of the management, quality and further scrutiny [12]. Their interpretation must be done with a caution that must be inversely proportional to the quality of the underlying data in the cases in which they are used [9] [13]:

- internally to an organisation, for its evaluation and improvement;

- externally, promoted by public or private organisations, for comparison of similar organisations (benchmarking) and for public information (accountability);
- for accreditation, selection and exclusion of health organisations;
- for research purposes.

Statistical indicators, in order to be useful for better healthcare and evaluation of changes in time, improvement and innovation, should also [7]:

- be useful and measure processes, results and costs;
- have numerators and denominators well defined in operational way;
- exploit the information provided by professionals, as part of their daily work;
- be based on the data collected with small representative samples rather than on all the available data without an underlying statistical model;
- be linked with projects of improvement.

Statistical indicators must be reproducible, accurate, sensitive to change, specific per each phenomenon, pertinent (measuring what they should measure), scientifically based, included in a decisional model, easy to obtain, easy to understand, timely, and not too expensive.

Per each statistical indicator, it is important to have a threshold or standard, that can be obtained empirically (e.g. the median or a given percentile of the observed data), or relating to national or international standards (e.g. the WHO Standards of Health 2010). For example, standards of care in day hospital and day centres offering services for elderly people may be obtained with cross-sectional surveys [10].

A group of indicators may be combined to form composite indicators (also called indices) which are usually calculated as a weighted combination of sub-indicators.

*Pros* and *Cons* of using composite indicators have been debated by the European Commission that has drawn the following considerations [11].

Composite indicators have the advantage to: a) summarise complex or multidimensional issues in view of supporting decision-makers; b) provide a «big picture» that makes easy the interpretation of a list of indicators; c) help attracting public interest and reduce the size of a list of indicators.

On the contrary, composite indicators: a) may give misleading, non robust policy messages if they are poorly constructed or interpreted; b) may invite politicians to draw simplistic policy conclusions because of their simple picture; c) may increase the quantity of data needed.

Good examples of composite indicators of international use are the UN Technology Achievement Index (TAI) developed in 2001 and the Human Development Index.

In general, composite indicators are used to build up socio-economic status indices, mainly based on consumption expenditure, but also integrated with a list of other information regarding household assets, housing characteristics, and availability of healthcare [8].

### 3. Indicators of Hospital Performance

At the European level [12], a lot of work has been done to summarize data on hospital performance and implement quality assurance policies in the European Union, accession countries and the other WHO Member States. General recommendations have been given by the health ministers of the Council of Europe in 1997 and best practices have been published by the European Commission. Performance measures in 192 UN Member States are summarised in the WHO «World Health Reports» that set out frameworks to evaluate performance of health systems for providing services and creating resources, financing and oversight.

According to a working group of the European Office of WHO, the main indicators of hospital performance should measure:

- clinical efficacy, including professional activities and results;
- care of the patients, including customer satisfaction, promotion of the patients' choice and their social support;
- productive efficiency, concerning staff engagement and use of infrastructures;
- security of patients and staff;
- issues concerning the staff management, including their satisfaction and professional development;
- strategies of good governance, including promotion of good health and continuity and equity of services.

Indicators of hospital health care quality may also be classified as Prevention Quality Indicators (PQI), Inpatient Quality Indicators (IQI), Patient Safety Indicators (PSI), and Paediatric Quality Indicators (PQI). The software for these four quality indicators has been designed and made available to the users by the US Agency for Healthcare Research and Quality [1].

The Prevention Quality Indicators constitute a set of measures based on hospital inpatient discharge data identifying «ambulatory care sensitive condi-

tions». These are conditions for which good outpatient care can potentially prevent the need for hospitalisation, or for which an early intervention can prevent complications or more severe disease. The PQIs consist of 14 ambulatory care sensitive conditions, which are measured as rates of admission to the hospital.

The Inpatient Quality Indicators are based on hospital administrative data, provide for observed rates and risk-adjusted rates (that are estimated as if hospitals had an average case-mix similar to that of the population), and include: a) *volume indicators*, as indirect measures of quality, being simply counts of admissions to perform certain intensive, high technology based procedures; b) *mortality indicators for inpatient procedures*, including procedures for which high mortality is associated with poor quality of care; c) *mortality indicators for inpatient conditions*, including conditions for which mortality has been shown to vary substantially across institutions and for which evidence suggests that high mortality may be associated with deficiencies in the quality of care; d) *utilisations indicators*, which are set differently in the various hospitals to respond to questions raised about overuse, underuse or misuse.

The Patient Safety Indicators, also based on hospital inpatient discharge data, provide for a perspective on patient safety. They screen for problems that patients experience as a result of their exposure to the health care system and may help to prevent new complications or adverse events. They are provided at two levels: a) *at provider level*, mainly based on the cases where secondary diagnoses suggest potentially preventable complications for patients; b) *at area level*, regarding the cases of the potentially preventable complications occurred in a certain area or country.

Finally, the Paediatric Quality Indicators applied to the paediatric population are formed by extracting the data on children from the other three sets of indicators.

In general, the studies that make use of the indicators at the hospital level focus on identifying and describing the differences among hospitals that might be indicative of potential quality problems, while relatively little research focuses on the possible determinants of such differences. A few studies [14] have recently tried to systematically link hospital-level quality indicators with managerial and clinical efforts to improve quality of care in the hospital setting.

One of the longest-running hospital performance measurement systems in the world, the Quality Indicator Project (QIP), was implemented twenty years ago in the US by the Maryland Hospital Association. This Project has demonstrated that the evaluation of hospital performance by means of statistical indicators is not only possible, but also is of great value because hospital operators are continuously involved in performance measurements and this renders significant results for the improvement of health care [3].

Since 1991, several Asian and European hospitals have gained experience with the QIP. With an increased agenda for social accountability, hospitals in Japan, the Netherlands and the UK have perceived the project as an opportu-

nity to learn about the internal performance profile and prepare for challenges in the health care industry. Following the success of pioneer hospitals in these countries, currently more than 200 hospitals in nine countries are part of the QIP. International hospitals participating in the QIP are also located in Austria, Canada, Flanders (Belgium), Germany, Portugal, Singapore, and Taiwan.

#### 4. Conclusions

Reporting quality information publicly is presumed to motivate quality improvement through two main mechanisms [15]. Firstly, public quality information allows patients to select high-quality physicians and hospitals; secondly, public report cards may motivate physicians and hospitals to compete in quality and, by providing feedback and by identifying areas for quality improvement initiatives, help physicians and health operators to do so.

Thence, information will become useful for continuous improvement of the efficiency and efficacy of health systems, as well as for guaranteeing high level of customer satisfaction.

Public reporting of health care quality represents therefore an important step towards openness and accountability among the health professionals, as well as the improvement of health care quality.

The use of appropriate statistical methods should guarantee that collected information corresponds to the needs of both the professionals and the patients, and that the information provided is complete and «statistically correct», e.g. accompanied by detailed description of the methodology adopted to define and calculate the indicators and their confidence intervals.

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