Measuring healthcare quality: the challenges

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Abstract

Purpose – Current health care quality performance indicators appear to be inadequate to inform the public to make the right choices. The aim of this paper is to define a framework and an organizational setting in which valid and reliable healthcare information can be produced to inform the general public about healthcare quality.

Design/methodology/approach – To improve health care quality information, the paper explores the analogy between financial accounting, which aims to produce valid and reliable information to support companies informing their shareholders and stakeholders, and healthcare aiming to inform future patients about healthcare quality. Based on this analogy, the authors suggest a measurement framework and an organizational setting to produce healthcare information.

Findings – The authors suggest a five-quality element framework to structure quality reporting. The authors also indicate the best way to report each type of quality, comparing performance indicators with certification/accreditation. Health gain is the most relevant quality indicator to inform the public, but this information is the most difficult to obtain. Finally, the organizational setting, comparable to financial accounting, required to provide valid, reliable and objective information on healthcare quality is described.

Practical implications – Framework elements should be tested in quantitative studies or case studies, such as a performance indicator's relative value compared to accreditation/ certification. There are, however, elements that can be implemented right away such as third party validation of healthcare information produced by healthcare institutions.

Originality/value – Given the money spent on healthcare worldwide, valid and reliable healthcare quality information's value can never be overestimated. It can justify delivering "expensive" healthcare, but also points the way to savings by stopping useless healthcare. Valid and reliable information puts the patient in the driver's seat and enables him or her to make the right decision when choosing their healthcare provider.

Keywords Quality assurance, Quality measurement, Performance indicators, Accreditation, The Netherlands, Health care

Paper type Viewpoint

Introduction

We can observe several initiatives in The Netherlands that measure healthcare quality to provide transparency to the public. Unfortunately, this is done in a non-standardised way by multiple organisations. One initiative is a weekly magazine called Elsevier. Since 1997, it has published hospital rankings based on expert opinions from general practitioners, physicians, nurses, managers and board members (de Hen *et al.*, 1997). Also, the Dutch Healthcare Inspectorate developed an ever-expanding quality performance indicator (PI) list that hospital staff are obliged to measure and report to the inspectorate. Results reported are rarely verified, so reliability is dubious. Subsequently, a Dutch newspaper published hospital rankings based on selected Healthcare Inspectorate quality PIs multiplied by the newspapers own weighting factor (Geenen and Wessels, 2004). Patient organisations developed their own specific quality PIs related to explicit diseases, such as diabetes, breast cancer and colon carcinoma (NPCF, 2010; de Ronde and Smit-Winterink, 2003). More recently, healthcare insurance companies followed with their attempts to measure quality based on the quality PIs – specific indicators developed by patient organisations and the Consumer Quality Index (Stubbe *et al.*, 2007). In 2011, a yearly guide (Dr Yep) was published for the first time, which ranked hospitals based on information provided by: staff; Healthcare Inspectorate PIs and mystery guest experiences (Dokter *et al.*, 2011). The most recent attempt, also in 2010, is Elsevier's revised list is based on public data such as the Healthcare Inspectorate PIs and treatment access times. In this information labyrinth, the same hospital can get different scores in one specific survey compared to other surveys in one year. All surveys invariably claim to measure healthcare quality and patients remain confused by inconsistent and continually their favourite hospital's varying rankings. Despite this claim, Lingsma (2010, pp. 240-2) concludes that the Dutch general public has access to different process and outcome measures, none of which represents care quality. In this article, therefore, we introduce a framework and an organisational setting for measuring healthcare quality that provides standardised, valid and reliable information to the public.

Lessons learned from financial accounting

Pronovost *et al.* (2008) state that reporting quality measures are like the Wild West because everyone is making their own rules (measures) and there is no external rule verification or enforcement leading to unreliable measures. The rapidly growing measures hospital managers voluntarily develop and publicly report have little assurance that measures are accurate, including whether there are unintentional biases or outright falsehoods. The contrast between financial and healthcare-quality performance reporting is dramatic. They suggest that healthcare managers could learn from the generally accepted accounting principles (US GAAP) as a model to develop a public healthcare-quality reporting system (Pronovost *et al.*, 2007). Porter and Teisberg (2006, 2007) argue that only with unbiased and reliable public reporting can we expect a value-based competition on results and in turn affordable high-quality healthcare. To better understand the Pronovost *et al.* (2007) analogy, the US GAAP's purpose is to assure the public that the stock represents the value as stated and that the public can trust the information provided by the company. In other words, this is an external role relative to the stakeholders and the public and this information pertains to the company's economic performance reported in the income statement and the balance

sheet. To assure that the external financial reporting is trustworthy, the US Financial Accounting Standards Board (FASB) and the European International Accounting Standards Board (IASB) develop standards and rules independently (International Accounting Standards Board, 2010). Furthermore, the company is required to hire an outside independent agent, a certified public accountant, to go over the books and verify that the numbers indeed represent reality and performance. This external reporting function is parallel to the quality assurance (QA) function in a quality management system (QMS).

Jayaraman and Rivenson (2008) argue that healthcare is more complex than finance services and that information conveyed in external reports may lack the details required by internal reports and vice-versa. No modern business management team, however, relies on the external financial statement for day-to-day operations. Thus, firms have a parallel internal management accounting system providing detailed information that does not follow GAAP and seldom, if ever, is shared with the public. As in financial management, a QMS incorporates an internal information method that does not necessarily follow any external reporting standards but helps managers control and improve quality. To obtain valid and reliable information, we explore the analogy between financial and quality management to organize structure and provide external reporting on healthcare quality for the public. We provide a brief quality management principles overview as the primary quality-information source. Then we take a closer look at the relationship between quality management and external reporting, known as QA. We provide a framework for measuring healthcare quality and suggest an organisation to provide this information to the public.

Quality management and measuring quality

According to Juran (1986), quality management's three principles are: quality planning; quality improvement and quality control (the Juran Trilogy). We discuss these three principles and look at them as quality information sources to support QA.

Quality improvement: is the most important function to establish an ongoing healthcare organisation, which needs to be done via special projects. Our team has ten year's experience implementing Lean Six Sigma in healthcare systems (van den Heuvel *et al.*, 2006a, b; Does *et al.*, 2006). From this experience, we know that information required for quality improvement (QI) differs from project to project. After closing a project, most information was useless because to preserve the improvement and to control the process, other data were required. Information to perform QI projects is highly specific, costly to gather and only useful for a short period. Therefore, this source is unsuitable for providing healthcare quality information to share with the public.

Quality planning: to improve healthcare, it is not sufficient to eliminate deficiencies, reduce medication errors and eliminate delays etc., by just doing projects. A key quality-planning objective is to design new processes to prevent repeating mistakes and without designing deficiencies into the new products, processes and services (Juran, 1988). A fairly simple example is introducing a new hospital-computer system to support medication prescription and distribution to reduce medication errors. Quality planning can be done in a structured manner, by systematically looking at healthcare markets, patient demands and present healthcare specifications. The specific path to be followed and the information needed to get to a newly designed

healthcare product are unpredictable, which means that the information generated in the quality planning process is specific, time dependent and closely related to unique questions. Therefore, this information plays a minor role in public reporting.

Quality control is the managerial process that provides stability to prevent adverse change and to maintain the status quo (Juran and Blanton Godfrey, 1999, p. 4.2). All employees, from the hospital floor worker to the CEO, exercise control. The only difference is the subject and control exercised by different groups. Healthcare professionals typically control product and processes related to the unit in which they work. Executives control budgets, revenues, costs etc. The information needed to exercise control includes PIs that are well known in every hospital. Performance can be measured from financial, production, efficiency, personnel and healthcare quality perspectives. Complications, postoperative infection rates and pressure sore incidence are popular. It takes effort to design an information system for controlling a specific department; i.e. nursing department control is a different compared to a fully automated production line. Quality assurance is similar to quality control (Juran and Blanton Godfrey, 1999, pp. 2.13-2.14); therefore information related to control can interest the external stakeholders. Special attention, however, is required when detailed control information from varying departments is aggregated and simplified to fit public reporting using a single indicator.

Quality assurance

Quality assurance activities provide evidence to establish confidence that quality requirements will be met (Gryna *et al.*, 2007). Juran pointed out that quality control and QA have much in common. Each evaluates performance and each compares performance to goals. Quality assurance's main purpose is to verify that control is being maintained. Performance is evaluated after operations and resulting information is provided to the operating forces and others needing to know, including senior managers, corporate staff, regulatory bodies and the general public (Juran and Blanton Godfrey, 1999, p. 4.3). Juran (1977) articulated the need for QA as an external function to complement the Juran Trilogy's internal management role. He also suggested that the financial function provides a useful managerial model for the quality function to emulate in job description and organisation terms.

How to report quality information

There are several ways quality information can be presented. The first and most obvious are PIs. It is tempting to use PIs because they have a precise and concrete aura. These two supposed virtues will most likely lose their attraction after an aggregation process through different departments and several hierarchical layers. The natural response is to add more and also more detailed indicators, which rarely provide more insight but instead is likely to produce more confusion. Additionally, based on Shewhart's work, we can demonstrate that hospitals with the same performance levels can produce different PI values owing to common cause variation (Mohammed *et al.*, 2001). Comparing these hospitals in league table format would, therefore, be meaningless because random variation is the only explanation for different scores. The second way to present quality information is QMS certification. Compliance with the ISO-9000 standards, for example, provides confidence that hospital managers have a well functioning QMS (van den Heuvel *et al.,* 2005; Marquardt, 1999). Certification,

however, does not guarantee healthcare quality. The third is accrediting the entire or parts of the healthcare organisation. Accrediting a healthcare institute by the Joint Commission or the NIAZ in The Netherlands, for instance, supports QMS's existence and functioning and provides guarantees that professional standards are followed. A recent study demonstrated that implementing a surgical safety checklist containing various professional standards in six Dutch hospitals was associated with a significant reduction in surgical complications and mortality (de Vries *et al.*, 2011). So, following standards enhances quality. Therefore, demonstrating that standards are met is a strong QA instrument. Certification and accreditation have in common that a third party verifies an organisation meets standards. The conclusion is fairly simple and transparent to the public; the organisation does or does not comply with the standards.

Different healthcare QA information
Based on the input-process-output model and Garvin and Juran's quality definitions, we identified five types of quality that can be measured to provide healthcare QA information (Boulding, 1956; Garvin, 1984):

(1) *Input quality* has to do with materials and professionals involved in healthcare processes. Well-trained personnel are expected to deliver better quality and a better hip prosthesis is expected to last longer. Serious quality problems related to prostheses have been described, for instance, in cardiac surgery (van der Graaf *et al.*, 1992). Most QMSs pay attention to this type of quality and it can be best made explicit by an ISO certification (van den Heuvel *et al.*, 1998).

(2) *Healthcare process quality* has to do with well-designed healthcare delivery processes and flawless performance. This quality can also be best made explicit by certification or accreditation. Unlike industry, the patient is an active participant in the healthcare production process. Therefore, some process PIs can provide relevant information. Access and waiting times, rework and medication errors are process PIs that are relevant to future patients (van den Heuvel *et al.,* 2006a, b). These indicators are not relevant to a person buying a product; s/he is not interested in the way the production process performs provided that product quality is excellent.

(3) *Healthcare product quality* has to do with the situation that exists at the moment healthcare delivery is completed. Has the treatment been performed according to professional standards? Were there adverse events or complications and treatment side effects? Because the patient is part of the healthcare process and the healthcare product (e.g. owning a new hip), there is some overlap between healthcare process and healthcare product quality. The best way to establish healthcare product quality is to assess the patient's healthcare status after treatment is completed. Reporting healthcare product quality is best done using PIs. When healthcare product quality items are closely related to the healthcare process (proper medical and nursing procedures have been followed), certification and especially accreditation such as the Joint Commission Accreditation are also appropriate.

(4) *Health gain* is quality we define similarly to reliability used in engineering – the probability that a machine performs, for instance after repair or maintenance, as intended under specified operating conditions for a specified time. Reliability,

therefore, is quality over time (Condra, 1993). Similarly, health gain could be defined as the therapy related reduction of complaints and limitations over time. So, if a patient gets a hip arthroplasty then the maximum health gain would be how long and what limitations the patient lives with if the best possible prosthesis was implanted; the best possible operating procedures were followed and after that the best care was given, until complaints return. The next question would be: what are the scores of the hospital and physician I intend to visit and how do they relate to the best possible result. This would provide an excellent quality PI. Who wouldn't want to know this before going to a physician? Although highly relevant, this information is hard to collect. It requires ongoing, sometimes 20-year measurements that is costly. Aggregation is hardly possible. What would the value of averaging one excellent and one poorly performing physician? Furthermore, the information is prone to being outdated after every innovation, such as a new prosthesis or a new surgical procedure. We consider this information the most relevant of all five quality types but, unfortunately, availability gets the lowest score.

(5) *Patient/client satisfaction* can be measured using questionnaires or interviews. This information can be obtained at reasonable costs and is especially relevant for improving patient and client services and quality planning. The relevance to QA is limited except to provide service-quality information.

Reporting, relevancy and availability

We now provide a framework in which we suggest how different quality information is best reported. The quality types, mentioned previously, are shown in the first column. In the second and third we show how healthcare quality can be best measured and made explicit comparing certification/accreditation and PIs. In the fourth, we estimate relevance to the public of information that can be produced from each quality type. In the fifth column, we estimate healthcare information availability.

The "Xs" in Table I represent scores. One "X" in the certification/accreditation and PI column means it is not suitable to measure in this type of quality and five "Xs" means it is suitable. In the relevance and availability columns, one "X" means low and five "Xs" mean very high. We identified five quality types that can provide healthcare quality information. Four are embedded in the QMS and information is available. Health gain is not or at least very rarely part of the QMS and this information is scarce. Unfortunately, health gain information is also the most relevant to the public and especially to patients. So, we have to realize when looking at quality that the most relevant information is least available. Information tapped from the QMS has to be

1. Quality type	2. Certification accreditation	3. Performance indicators	4. Relevance	5. Availability
Input quality	× × ×	×	× × ×	× × × × ×
Healthcare process quality	× × × × ×	× × ×	× × ×	× × × × ×
Healthcare product quality	× ×	× × × ×	× × × ×	× × ×
Health gain	×	× × × × ×	× × × × ×	×
Patient/client satisfaction	× ×	× × × ×	× ×	× × × ×

Table I.
Reporting different types of quality, relevance and availability

processed or at least aggregated to become relevant to the public. Two physicians, one excellent and the other poorly performing, demonstrate that aggregation deteriorates the information. Lingsma (2010, p. 49) found that apart from differences in care quality, the larger part of the observed differences between hospital quality PI scores can be attributed to random variation, patient characteristics that were not adjusted, residual confounding because of imperfect case-mix correction and registration bias. She concluded, therefore, that no outcome indicators currently used are suitable for ranking hospitals. Given these quality PI imperfections, one could imagine that QMS certification, like ISO-9001:2008 or healthcare system accreditation like the Joint Commission might provide better transparency and assurance to the public than current quality-PIs.

Organizing quality assurance

Developing valid, reliable and relevant information to really measure quality is only one QA aspect. The other, also suggested by Pronovost *et al.* (2007) is to set up an organisation to produce this information. We recognise five activities to organize QA:

(1) *Determining which quality PIs are required to provide the most reliable and valid healthcare quality picture.* This is a challenge given the current PIs' poor validity and reliability. So, better PIs have to be developed. Furthermore it has to be an ongoing process – inventing new PIs and updating existing ones.

(2) *Determining the rules regarding how each PI has to be measured.* In pressure ulcer cases, one could for instance exclude the child department or measure and report only departments (like the ICU) that are prone to pressure ulcers. Also, schemes for measuring pressure ulcers have to be designed to reduce registration bias. Guidelines are needed for total patients to be included to reduce random variation. Finally, strict rules have to relate to case mix adjustments.

(3) *Measuring PIs by healthcare organization staff.* Preferably these measurements are performed and incorporated in the ordinary quality-management process. Given the right PI's and rules, registration bias has to be reduced in this step.

(4) *Verifying results and measurements independently that can be compared with a certified public accountant's work.* A management letter can be produced that gives an impression of the total-quality measuring process. This can be added to the final quality-information publication.

(5) *Aggregating and transforming quality information into an overall hospital-score on one or more dimensions.* This process also needs specific guidelines, for instance on weighting factors and external verification otherwise some quality information might look useful but in fact is worthless.

The Netherlands Healthcare Inspectorate covers the first two activities. They recommend PIs and guidelines for measuring them. There is debate between the Inspectorate and medical specialists about their relevancy and validity because the indicators were also used to judge physicians and hospitals. To prevent this counterproductive debate, service-quality PIs have to be developed and defined by boards of independent experts, like the FASB and the IASB do for accounting rules. Indicators used to evaluate a hospital by the Healthcare Inspectorate will most likely

differ from indicators that are valuable for informing the public. So, the ultimate goal producing and publishing an indicator has to be perfectly clear. To deal with the last two activities, verification and aggregation, independent organizations comparable to accountancy firms in the financial world are required. When we look at certification and accreditation, the situation is more mature. There are organizations engaged in developing QMS standards and safety management systems and these standards have been customized to healthcare (ISO, 2001). Also there are independent organizations that can execute certification or accreditation and provide specific certificates. Perhaps this situation is an additional and a strong argument for stimulating certification and accreditation as healthcare QA instruments.

Conclusions

We can see in The Netherlands that PIs are not suitable for determining quality differences between hospitals. Healthcare quality reporting can improve in a similar way to financial reporting. Quality assurance information, therefore, has to be derived from the healthcare institution's QMS. We identify five healthcare-quality types and provide an overview how they can be measured to produce quality assurance information – using PIs and accreditation or certification. Health gain PIs provide the most valuable healthcare-quality information. Unfortunately, they are the least available and, therefore, need further developing. To provide valid and reliable QA information, independent boards like accountancy-based FASB and IASB need to develop standardised healthcare quality PIs and rules to measure them. Also, preferably other, independent organisations, comparable to accountancy agencies, are required to verify and validate healthcare institution PI scores. Only by implementing a coherent system can reliable and valid healthcare information can be produced and presented to the public. Certification and accreditation can separately or in addition to PIs also produce valuable healthcare information. Valid and reliable healthcare quality information must be available if patients are to be in a position to make the right decisions when choosing their healthcare providers.

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