



INSTITUT FÜR QUALITÄT-SYSTEME
IN MEDIZIN UND WISSENSCHAFT

The three facets of medical quality

Dr. med. U. Paschen

Hamburg, 2010

Version: 30.09.2010

© IQ Institut für Qualität-Systeme in Medizin und Wissenschaft GmbH

Summary

The distinction between three facets of quality – design, performance and appropriateness – allows the identification of measurable and testable characteristics, which make up a ‘set of characteristics’ of any medical treatment. Beside effectiveness and safety, the importance of ‘acceptability’ is stressed as a key characteristic.

The facets overlap partially and are contingent to each other but cannot offset each other nor be reduced to one of them. The characteristics are not equivalent. They make up a set of characteristics. Quality in medical practice is understood as the appropriateness of procedures to resolve individual problems of the patient. The concept of quality is the same in public health policy but the meaning of appropriateness is different.

Key words

Medical practice

Public health

Performance

Design

Acceptability

Appropriateness

1 Introduction

Many quarrels on the quality of medical treatment could be avoided if one distinguishes three facets of quality: these are design, performance and appropriateness. Each of these facets has its own individual, assessable and measurable set of quality characteristics. The distinction of these facets greatly benefits both practice and theory of quality-management.

By contrast, the older distinction [1] of ‘three qualities’ – structure, process and outcome quality – is incompatible with the more recent, process-oriented notion of quality that has become international standard [2]. While the equipment of hospitals with rooms, technical instruments, qualified staff etc. is often seen as an independent ‘quality of the structure’ of itself, this view overlooks the fact that the value of the equipment can be measured only by its suitability for treatment processes. ‘Structural quality’ is not independent of process: for example, a hospital without surgery will not need an operating theatre.

Neither do the often quoted ‘outcomes’ possess an independent quality in themselves. Treatment processes are aimed at instigating a positive turn in the course of a disease. Arguably, this does not always work. If treatment outcomes are more often positive than negative, this is called the ‘effectiveness’ of the treatment. ‘Obtaining good outcomes’ is then one of the quality characteristics of medical treatment processes – but it is not an independent ‘quality’ in itself!

2 The three facets

The sole object of quality management is the treatment process or the procedures from which it is composed of. In medicine, this means the procedures in diagnostics, therapy, general care, physiotherapy etc. The confusion surrounding the characteristics of quality can be resolved if the facets of design, performance and appropriateness are distinguished. It will be shown that individual characteristics can be assessed and measured in this way. This approach will also lead to a better understanding of how suitable

treatment decisions can be made that meet the individual needs of the patient.

2.1 The facet of design

If the conduction of an electric stimulus is blocked in the AV-node, there will be no contraction of the myocardium. For therapeutic measures, a treatment process can be designed: via an electric carrier, a beat provider and an energy source, the impulse is transported directly into the heart chamber. The wire could be fixed directly onto the heart or anchored as a lead in the trabecula of the ventricle. The stimulus impulse can be controlled via the atrium. Such a procedure 'in itself' can be designed and theoretically advanced, even if the idea is never tried out practically, in an experiment. This we call the 'design' of the procedure [2].

In the experiment it will be assessed whether the procedure is effective (leading to the desired events), whether it is safe (undesired events do not or only rarely occur) and whether it is tolerable for the patient. Sometimes, a mere thought experiment suffices, or the effect can be shown in vitro, perhaps in animal experiments. Ultimately, only clinical assessment will show how effective the procedure is in human beings.

The design of the procedure can be improved. This is how the cardiac pacemaker became safer with time and, due to its increasingly miniature size, more tolerable – its effectiveness, however, has improved only minimally.

2.2 The facet of performance

Performing the design of the treatment procedure poses new problems that need resolving. This starts with the manufacturing process of lead and battery. How can the lead be installed in the right place? Who controls the imaging process? How can sterility be assured? The correct implantation of the pacemaker, however, is largely independent of the design. With practice, the performance of the procedure will improve, getting faster and simpler until each of the steps has been perfected. Through monitoring, irregularities can be recognized and corrected immediately [3].

Duration, continuity, stability, reliability and the ability to react without delay are characteristics of the performance, not of the design, of a treatment. Inaccuracies or mistakes can render the treatment ineffective or unsafe – yet, the treatment design remains unaffected.

2.3 The facet of appropriateness

If the patient does not suffer from bradycardic dysrhythmia, the pacemaker's outstanding design and perfect technical and operative performance become irrelevant. In this case, the treatment with a pacemaker is inappropriate. Inferior quality – and with that, inappropriate care – is often the avoidable result of erroneous diagnostics or of too broadly defined indications.

Appropriateness is to be understood here in its literal sense: a lack of knowledge of the patient's needs and of the treatment characteristics cannot lead to the selection of an individually suitable treatment. Every case is uniquely different. In this sense, medicine is always a matter of 'individual manufacture' (if we do want to compare it with an industry at all), it can never be 'mass production'. As the SGB V (German Code of Social Law) puts it: doing 'the necessary – yet, without moving beyond what is necessary'. The practical outcome of this directive will vary according to its context, be it in individual patient-doctor-relationships of medical practice, or in the more general concerns of public health. As we shall see, this distinction bears the greatest potential of confusion in regards to the conceptualization of quality.

2.4 Practical examples

Whether an antibiotic is toxic, carcinogenic, or teratogenic and finally effective, can be assessed in vitro or in animal or clinical experiments. The pharmacist assesses the galenics. Clinical assessment determines whether the effect is relevant in the case of an infection. This is the idea, the design. Problems of performance occur when the dosage is too low or when interactions with other medications are overlooked, or in the cases of low patient compliance and premature termination of the therapy. Such

problems can render the antibiotic ineffective and lead to renewed proliferation of the pathogens. Nonetheless, the antibiotic 'in itself' remains effective.

The very first: the antibiotic may have been incorrectly selected and therefore be inappropriate: it may be highly effective against staphylococci and the right dosage is taken. Yet, the infection may be driven by a different or antibiotic resistant pathogen.

The three facets are present in all processes, not just in medical treatments:

A laboratory method is exact, precise, reliable etc. If the method is performed incorrectly (i.e. at a too low temperature) this will produce misleading results – but again, this is a problem of performance, not of procedure, the design 'in itself'. Conversely, a procedure can be inadequate as regards a specific problem – even though the procedure 'in itself' is performed correctly and produces precise measurements.

The preparation of a meal is described in a recipe. Just a single mistake in the performance (i.e. too much salt) will render it unpalatable. But why cook a meal if nobody is hungry?

A play or a piece of music may be good 'in itself' but it may lack in presentation or it may not 'hit a nerve' with the audience. Any good audience knows how quickly such a performance can disintegrate and fall apart.

This is exactly what is being distinguished as regards the three facets of quality: it is possible to do the right thing correctly and in the right case. A treatment that is good 'in itself' can be performed on the 'right' patient but it may be performed incorrectly. On the other hand, a treatment that is ineffective 'in itself' will not become effective by a perfect performance. A therapy does not make sense, it is 'inappropriate', if the patient would have recovered without any treatment.

3 Quality and Design

3.1 3.1 Characteristics of therapy

The design of a treatment procedure is characterized by two attributes of quality, effectiveness and safety. Both attributes can be expressed in terms of probability:

Effectiveness improves the probability that a desired event may occur in any given result context or pool. Here we may say, the higher the probability the better.

A result pool may for example consist of a number of patients suffering from an infected wound. While the wound heals in some patients, the infection may continue in others, and in others yet, it may even exacerbate. The desired event is the elimination of the pathogenic germs (primary effect), followed by the healing process (therapy aim). The antibiotic is effective when the desired effect occurs in the result pool more regularly 'with' than 'without' the antibiotic.

Safety is measured by the probability of an undesired event in the result pool. If we say that the undesired event is an allergic exanthema, then antibiotic A is safer than B if the patients receiving A have a lower occurrence of exanthema than those receiving B. We may say, the lower the probability, the better.

Effectiveness and safety are qualitative attributes or characteristics of the design, as they are tested in one and the same result pool. One group receives the substance that is to be tested, while the reference group receives a substance whose ineffectiveness is known (but this is not necessary). The substance leading to the desired event more regularly is seen as the 'more effective' substance.

The more significant the deviation of occurrences between the two groups, the more we are convinced of the actual difference between the two tested antibiotics. The accumulation of particular events in the one group may arguably be merely coincidental. Yet, these differences will level out over the course of further observations and experiments. Which one of the two errors do we

think is more risky: the assumption of a substance's effectiveness even though it is not effective or the assumption of its ineffectiveness even though it does show an effect of a kind? Both errors are calculated into the experiment in terms of an error probability.

It is important that we do not confuse the probability of an *error* with the probability of an *event*. The former tells us more about the accuracy of our judgment than the discrepancies of the procedure. We need to keep this in mind if we want to measure effectiveness on a nominal scale.

As with all comparisons, there are certain rules that need to be observed. For example, neither the investigator nor the investigated should know which of the two medications is being used for treatment. The observations of the event must be made in an unbiased, objective manner. All events must be reported comprehensively. The result pools must be identical. In short, the test conditions must remain undisclosed to ensure random sampling.

Only if these conditions are met can the rate of occurrences be calculated reliably, and only then can we base our statements about effectiveness and safety in objective evidence. If we lack such evidence we cannot know anything about effectiveness and safety. In this case, we must rely on guesswork and speculation. This does not mean that our speculations are necessarily wrong – but we cannot be sure that they are right either.

Clinical assessment is not equivalent to the epidemiological study of a naturally occurring patient pool. In clinical assessment, selected patients are grouped together so that a largely homogeneous result pool is achieved. In this sense, clinical assessment is a rather artificial and constructed experiment [6] – and, as is true for all experiments, the conclusions we can draw from it are limited. This cannot be avoided. It is the only kind of knowledge we have. Statements on effectiveness always need to be transferred to a treatment case by way of analogy with other, similar cases. For example, if penicillin was tested on a group of young men with appendicitis, it should be well considered whether it could

be used in a group of children with otitis media or elderly women suffering from bronchopneumonia.

3.2 Design characteristics in diagnostic procedures

Diagnostic procedures are characterized by the attributes of correctness and precision. If we use the example of a target whose centre represents the target value, then correctness describes the distance of all hits to the centre. If we form a median value of all hits in total, then this 'ideal' value could even denote the exact centre despite the fact that it did not receive any hits.

If all hits repeatedly miss the centre but are located close to each other and in a similar distance to the centre, then we can say that the shooter's aim is precise but not correct.

The best result would obviously be if all hits surround the centre very narrowly: the shooter aims correctly and precisely, in short: he is exact.

Both attributes of quality can be described statistically. With time we have accumulated reasonably reliable data for most diagnostic tests such as laboratory analysis or the assessment of physiological parameters. The reader's attention be directed here to the standard literature [7, 8].

As before, our concern here is not so much with certainty but rather with the question of how much error we accept and account for. High accuracy is not necessarily always essential. When determining blood sugar content, the requirements for results between 50-180 mg/dL differ from those for higher results. For general screenings, the urinal excretion of any sugar suffices to make an assumption. How important is the test sensitivity? In avoidance of false negative results one can choose a very finely tuned test but in turn has to accept false positive results that need to be corrected later in more specific tests.

The characteristics of quality, precision and correctness, aid us in selecting the right test according to the problem at hand. However, whether broad mamma-screening can contribute to a decrease in carcinoma-related mortality is again a question of the effec-

tiveness of early and targeted therapy measures, not of the diagnostic procedure and how it is performed.

3.3 Acceptability

One of the less explicitly discussed characteristics of quality is the acceptability of medical treatment. Yet, acceptability always plays the decisive role! It is not altogether ignored, of course; but due to a lack of precise definition, acceptability is rather an implicit, underrepresented factor of quality [10]. Acceptability is a combined characteristic of design and performance. For this reason, the discussion of the characteristic acceptability is emphasized here, not as an excursion, but as an important characteristic in its own right.

Rather than by way of a comprehensive definition, acceptability will be described here with some examples: as children have trouble swallowing the large penicillin tablets, penicillin syrup has been developed. Regardless of its form, tablet or syrup, the penicillin is equally effective and safe. The syrup is more 'acceptable' for children but it is not less effective. The effectiveness and safety of oral contraceptives are convincing. But problems with their acceptability, for example, religious concerns and concerns for social consequences, have led to vehemently negative responses in the past. Such reactions should not be misunderstood as negligible or inconsequential. After all, low acceptability may result in low patient compliance or discontinuation of the therapy and accordingly will have adverse effects.

Acceptability of a treatment is also dependent on surrounding factors, such as the question of whether it is necessary to be hospitalized or the length of the waiting list. Other concerns might include whether the treatment is painful or requires a special diet or whether visible scars will remain. Surgery under anesthetics is always more acceptable than without. Dialysis administered at a night clinic is just as effective as if performed during the day. Yet, it is much more acceptable for a working professional.

Acceptability is always peer-group-dependent. A syrup is good for children, less so for adults. Some people may reject a certain

treatment for fear of being humiliated. To some, eating pork is unacceptable.

In recent decades, perhaps in order to avoid fostering unreasonable expectations, our efforts to achieve acceptability have been underrepresented. However, with broader options of choice, it becomes clear that the characteristic of acceptability plays the decisive role when considering two equally effective and safe therapy procedures. This is not a superficial or unreasonable observation, it is only logical.

Another issue we need to address in regards to acceptability is the differentiation of various levels of expected standards. It is not always necessary to offer the exact same quality in varying situations. In many cases, less elaborate – and less costly – measures are sufficient. For example, rather than altogether abolishing certain treatment options, they could become more economically viable if they are tailored to specific needs.

4 Quality of performance

Even though a treatment procedure has been tested for its effectiveness and safety, we cannot exclude the possibility of deviations from the procedure, for example in everyday hospital routine. Malpractice in the implantation of a pacemaker is down to the performance of the operating surgeon; it is not a problem of the procedure design. Similarly, an analytical instrument must be carefully calibrated or it will produce inaccurate results – again, correctness and precision of the procedure ‘itself’ remain unaffected. Even highly potent medication will fail to produce positive results if it is taken irregularly. Mistakes in performance will render any good treatment ineffective.

The distinction between (theoretical) efficacy and (practical) effectiveness is misleading. There is only the effectiveness of the procedure itself, whether it is performed accurately or not. We have robust treatment procedures that are reliably effective and safe even in the case of gross mistakes. Other, more delicate and sensitive procedures will be rendered invalid by the slightest mistake. The quality characteristic of ‘robustness’ [11] can be meas-

ured by its therapeutic breadth. For example, it is possible to administer penicillin in inefficient dosages but it can not be overdosed easily. Slow release drugs improve the performance by maintaining the medication level in the case of intake irregularities. Such a therapy we call robust.

Until now, characteristics of performance have not been investigated as much as those of design. In the laboratory, attributes such as stability, continuity, reproducibility (independent of place, instrument or investigator), robustness, reliability and error frequency are part of the procedure to ensure validity of the results.

What are the performance characteristics of therapy? Therapy irregularities (a lack in continuity), deviations such as instable service provision or therapist variability, and a higher error frequency, are attributes of change in performance.

A quality control card is the investigative tool for performance characteristics. Quality control samples are used in laboratory settings to test the stability of calibrated measuring devices. Such samples or cards can also be used for the factors of continuity and reliability.

The attributes of performance are measured by performance indicators [3]. These denote the characteristics of performance, not of design! Much confusion can be avoided if this fact is kept in mind. Performance attributes such as stability, reliability etc can be measured but not its 'quality' in and of itself. If the frequency of c-sections varies around an average of 30%, then this indicates stable obstetric therapy decisions. Whether a lower rate of c-sections is preferable to a higher rate, however, is not indicated on the control card.

For measurements of performance we require long term data. As Shewhart [12] demonstrated in the 1930s, such an investigation can rely on regular and well-tested statistical formulae. The procedures in a particular institution can be measured over a period of time and evaluated. It would be a mistake if we attempted to compare 'quality' in two differently working institutions. Only the

performance of two identically designed procedures can be compared. This confusion of design and performance was the main problem of statistical-comparative approaches to quality assurance. This approach was naïve in that it assumed uniformity of procedures regardless of context and in its disregard of appropriateness.

Some of these data sets, however, could be utilized as performance indicators that guide the maintenance of stability, continuity and process capability in hospitals. In combination with administrative and selected security data, they could be employed on internal hospital control cards. These can be equipped with an automated alert level that activates maintenance inspections. Threshold values can be introduced that, if they are exceeded, initiate system shut-down or revise its calibration.

5 Quality and appropriateness

5.1 5.1 Quality as a set of characteristics

When selecting an appropriate treatment procedure, we cannot simply add up the identified characteristics of design and performance in an aggregate value. Some procedures are very effective and safe, for example anesthesia. Sometimes, effectiveness can only be achieved at a great risk, for example in certain surgical interventions. In some cases, safety is preferred to effectiveness. An unsafe procedure is intolerable. Acceptability tips the scales when effectiveness and safety are equal. After all, how can I benefit from a procedure if it is not affordable or achievable for me?

Our high expectations regarding the performance of medical treatments, be it in regional hospitals or at an urban university hospital, are justified. At the same time, is it really necessary that all hospitals offer the most recent design of a procedure? In terms of stability and continuity, many smaller hospitals may be better than some of the bigger hospitals. Even if they do not offer the latest, most advanced procedures, they may show a higher rate of reliability and lower error occurrence.

These are the characteristics that need to be considered but that cannot be offset against each other. The characteristics of quality add up to an entity that we call 'quality' in general. This realization has become an important part of recent definitions of quality [2]: quality is defined by a 'set of characteristics' that must meet the customer's needs and expectations to the greatest possible degree.

A 'set of...' is used here in a similar way in which we would refer to a set of silverware, fork, knife and spoon. They are different things, used for different purposes, yet sometimes become useful only in combination. But they cannot simply replace each other.

In any case, the quality of medical treatments cannot be reduced or limited to their effectiveness [13]. Effectiveness is important but it is certainly not the only characteristic of quality. The most effective treatment is not inevitably the best. Those who adhere to this misunderstanding will be unable to understand that many well-founded doctor and patient decisions are guided by other characteristics as well.

5.2 5.2 Appropriateness and decision-making

How can the best treatment for individual patients be selected? This is the vital question of clinical decision-making. It can be answered by discussing objectives and wishes with the patient and letting them decide which treatment option seems the most tolerable to them. Yet, it is the nature of any therapy procedure that its effectiveness and safety cannot be fully predicted for every individual case.

The characteristics of therapy-design are tested in large, homogenous result pools. Whether an individual patient is actually the right 'case' for a particular procedure needs to be considered individually.

It should be emphasized: in order to be reliable, our knowledge of the characteristics of design and performance must be evidence-based. The questions we need to answer cannot be shortened. How much effectiveness is required? What kind of risk is in-

volved? What inconveniences must be accepted? What is the standard of our performance? The selection of a treatment must be decided individually and can only be made once the needs of a patient have been carefully analyzed.

The decisions can vary according to the patient's condition. Uniform administration of a therapy, regardless of individual circumstances, will not do justice to the patient's needs. Without being cynical, a fractured radius in a laterally paralyzed patient with apoplexy will be treated differently than in a professional pianist.

In some cases, we arguably have not much to offer to the patient. Too often, the choice can only be between lingering illness, followed by certain death on the one hand, and the attempt to at least influence the course of the disease on the other.

Almost invariably there are several treatment options. The tumor can be surgically removed or treated with radiation therapy or with cytostatics. Homeopathic treatments are also acceptable. There are no 'right' or 'wrong' treatments. All we can say is what we know about their typical characteristics. A treatment rarely consists of one singular procedure. Instead, an individual treatment project is constituted by a configuration of therapeutic and diagnostic, general care and allied health procedures. No two treatments are the same. The success of a treatment plan can be judged only in its entirety – and by individual, patient-dependent parameters, in other words, whether it was tailored 'appropriately' towards the patient's specific problems.

As so many factors need to be considered, it is not surprising that some decisions may occasionally lead to unexpected results. Decision-making processes are always intuitive – there is much room here for the renowned capability of doctors to rely on a combination of experience and intuition. Such decision-making processes are based in practice not in science. Our knowledge in quality-management, on the other hand, is not intuitive but evidence-based. Intuition must be guided by knowledge.

Ultimately, it is the patient who decides, following medical advice. A 'good' decision requires that all characteristics of quality

have been identified, measured and tested. They must be known to all persons involved and be put in an operational context. In this way, the treatment can be selected from a 'set of characteristics' that ensures that the patient's needs are met to the highest possible degree.

5.3 Two levels of appropriateness

The fulfillment of individual needs is not the task of policy-makers and society. They can and must have other goals. It is impossible for politicians to know the individual citizen's dispositions. Neither can such individual dispositions be reflected in policy-making. This is the task of doctors. Politicians need to consider what consequences their decisions have for society, economy etc. Their idea of the 'appropriateness' of a clinical service will naturally differ greatly from that of a doctor.

For this reason, the government in a resource depleted country may prefer an effective vaccination program to the introduction of high-tech medical procedures in its hospitals. Whether these measures are effective, whether they are implemented in a timely manner and whether the programs are appropriate and meet people's expectations, is then a matter of the quality of public health policy, not of medical treatment.

Government investors are usually not well placed to assess medical services 'in themselves'. They can, however, demand economically efficient performance. If two services have identical design and performance characteristics, it is acceptable to choose the less costly option. It is also permissible to deliberate over the expenditure for higher acceptability. Nonetheless, economic viability is not a characteristic of quality, it is an economic consideration that regards services of identical or comparable quality.

These perspectives cannot be called immoral. They are simply different to those of patient-oriented acceptability: it is certainly reasonable to ask whether a service or treatment is worthwhile. However, the contradictions become unsolvable if we confuse the two spheres of action: on the one hand, there is the informed patient decision, on the other, political decision-making processes.

These are guided by epidemiological concerns and aim for a just distribution of limited resources, whatever the achievable standards. Inappropriate treatments in individual cases are a waste of resources. Conversely, if resources are subjected purely to considerations of societal gain, then this leads into a well-known aporia: such a cost-benefit calculation, if thought to its logical end, could lead to the discontinuation of medical treatments. Evidently, this is not a viable option.

Only if we have a clear concept of quality and its three facets can we hope to resolve this confusion.

6 Literature

- [1] Donabedian A Evaluating the Quality of Medical Care. In: Milbank Memorial Fund Quarterly Health and Society. 1966; 44: S. 206.
- [2] DIN Deutsches Institut für Normung e.V. DIN EN ISO 9000:2005, 01.12.2005: Qualitätsmanagementsysteme - Grundlagen und Begriffe.
- [3] Joint Commission The Joint Commission's framework for improving performance. From principle to practice. Oakbrook Terrace IL. 1994
- [4] Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen Kosten-Nutzen-Bewertung. 2009: Online verfügbar unter <http://www.iqwig.de/index.736.html>, zuletzt geprüft am 30.01.2010.
- [5] Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen Methodik für die Bewertung von Verhältnissen zwischen Kosten und Nutzen. 2010: Online verfügbar unter http://www.iqwig.de/download/Methodik_fuer_die_Bewertung_von_Verhaeltnissen_zwischen_Kosten_und_Nutzen.pdf, zuletzt aktualisiert am 19.10.2009, zuletzt geprüft am 30.01.2010.
- [6] Matthews J R: Quantification and the quest for medical certainty. Princeton, NJ: Princeton Univ. Press 1995
- [7] Kraemer H C: Evaluating medical tests. Objective and quantitative guidelines. Newbury Park: Sage 1992
- [8] DIN Deutsches Institut für Normung e.V. Statistik. Schätz- und Testverfahren. 3. Aufl., Stand der abgedr. Normen: Dezember 2009. Berlin: Beuth (DIN-Taschenbuch, 224) 2010
- [9] Gøtzsche PC, Nielsen M Screening for breast cancer with mammography (Review) This. In: Cochrane Collaboration, H. 4. 2009
- [10] Paschen, U): Annehmbarkeit macht den Unterschied. In: Dtsch Arztebl, 2007; 104: A1008-11.

[11] DIN Deutsches Institut für Normung e.V.: Qualitätsmanagement und Statistik. : Begriffe, Normen. 5. Aufl., Stand der abgedr. Normen: Oktober 2009. Berlin: Beuth (DIN-Taschenbuch, 223) 2010

[12] Shewhart WA, Deming WE (: Statistical method from the viewpoint of quality control. 1. publ., unabridged republ., Graduate School of the Department of Agriculture, Washington, D. C., 1939. New York: Dover Publ. 1986

[13] Lohr K: A Strategy for Quality Assurance. A report of a study by a committee to design a strategy for quality review and Assurance in Medicare. 2 Bände. Washington D.C., USA: National Academy Press (Bd. 1). 1990

This article should be cited as
Paschen, U Die drei Beiträge zur Qualität der Medizin
Gesundh ökon Qual manag 2011; 16: 1-6 (german)



INSTITUT FÜR QUALITÄT-SYSTEME
IN MEDIZIN UND WISSENSCHAFT

© IQ-Institut 2010

Nachdruck nur nach Genehmigung erlaubt.

IQ Institut für Qualität-Systeme in Medizin und Wissenschaft GmbH

Fruteweg 24 A 22559 Hamburg

Telefon. 040/822 907 97; Fax: 040/822 907 96, contact@iq-institut.de

Verantwortlich: Dr. med. Ulrich Paschen

English version created on: 10.07.2010