

# Process Potential Screening

## An Instrument to Improve Business Processes in Hospitals

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### Summary

**Objectives:** Hospitals are increasingly under pressure to optimize their processes. So far, an instrument to systematically identify the potentials for improvement of a given business process is missing. The aim of this project is to develop such an instrument.

**Methods:** Initially, central aspects of the quality of a hospital process were identified on the basis of a systematic literature review. Secondary to that, criteria to measure quality aspects were defined: More than 300 criteria from medical and business informatics, economics and quality management publications were gathered and systematically aggregated.

**Results:** As a result, the Process Potential Screening (PPS) instrument was developed. The PPS is a matrix containing two axes: Axis I comprises 30 quality aspects referring to results, execution and control of hospital processes. Axis II comprises 16 quality criteria (e.g., customer satisfaction, time). The PPS displays approximately 400 relevant combinations of those quality aspects and quality criteria that help to identify potentials for improvement of a given hospital process. It utilizes different methods for the measurement of the criteria and for application by way of individuals or groups.

**Conclusions:** In using the PPS, relevant potentials for improvement were identified in ten typical hospital processes. The instrument's practicability must now be examined in further studies by the final target group (e.g., quality or project managers, and the staff responsible for processes).

### Keywords

Business process, process management, process evaluation, quality management, health informatics

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## 1. Introduction

Hospitals are increasingly under pressure to perform: If they want to remain competitive on a long-term basis, they must offer expeditious high-quality service with low cost. To achieve this, hospital processes must systematically be planned, evaluated, and improved towards the customer's requirements. Existing weaknesses in the ongoing processes have to be totally identified to ensure that the right procedures for reorganization can be derived [1, 2]. For this an instrument is needed that includes all relevant quality aspects and criteria of hospital processes [3].

Many authors suggest defining key performance drivers, for example by using a balanced score card [4, 5], to evaluate a hospital process [6, 8]. However, these key drivers often only focus on financial indicators, and moreover, they are mainly defined for the processes' results only. So, a further analysis is still needed for identifying weaknesses in the execution of the process. This localization of weaknesses often is described as being a creative act, requiring an analytic way of thinking [9, 10]. But instruments for supporting an analytic analysis are rarely found and often not comprehensive enough: Most of the checklists that describe how to organize a business process [6, 11, 12] do not consider the particular characteristics of hospitals (e.g. ethical criteria). Other instruments only support the choice of the processes' elements for being analyzed: The critical-incident analysis or the blueprint method, for example, chronologically evaluate the processes' contact points between the staff and customer [13] and consider them as "moments of truth" of the processes' quality [14]. Although both methods help to analyze the processes' ele-

ments in a meaningful sequence, they do not support the choice of quality aspects and criteria for the evaluation.

Thus, the evaluation of hospital processes often takes place in an unsystematic way [3]: The potential for improvement is identified intuitively by "observing and considering" the modeled process, e.g. by using the brainstorming method. This has at least two disadvantages: 1) The evaluation only focuses on the process elements illustrated in a flowchart model, disregarding important quality aspects such as the definition of the processes aims or its relation to the super-ordinate process. 2) The selection of the criteria depends on the individual view of the observer: A financial viewpoint focuses on financial and time-related criteria during evaluation (e.g. [6]), a psychological viewpoint on the so-called human criteria such as physical and mental stress (e.g. [15]), and the view of the medical practitioners may put medical criteria first (e.g. [16]). But if a process is only optimized on the basis of one kind of criteria, for example on financial criteria, this may result in a decrease of its quality within other areas, e.g. in the degree of the customer satisfaction with the processes' results.

## 2. Objectives

The aim of this project is to develop a procedure for the identification of potentials to improve a hospital process. It should systematically evaluate all of the relevant aspects (e.g., quality of the result, quality of the execution) and all criteria relevant to the quality of a hospital process (e.g., cost, quality, time), and it should fulfill the following requirements:

- It should be applicable to all processes in the hospital and therefore contain general quality aspects and quality criteria. The unit of investigation should be a single hospital process regardless of its aim and how it is related to other processes of patient care.
- Individuals as well as teams who are responsible for analyzing and improving processes in the hospital (e.g., quality circles, task forces, process owners) should be able to use it.
- It should be suitable for evaluating a process in its planning as well as in its realization phase, and also for comparing the quality before and after the implementation of changes.

### 3. Methods

During the development of the instrument the questions, how the quality of hospital processes is characterized and of which unique quality aspects quality is comprised, were considered.

#### 3.1 Which Aspects Are Relevant to Evaluate the Quality of a Hospital Process?

In the first step we divided the quality of a hospital process into individual quality aspects following the known concept where quality is divided into parts [17, 18]. We started to divide the quality into two parts: the quality of the results, and the quality of the execution of the process. The quality of the execution of the process was again divided into the following aspects: “how well the start- and end-points of the process are chosen”, “how well the single process steps and activities and their coordination are performed”, and finally “how good the resources” are.

In the second step the specific characteristics of the processes of patient care were analyzed to integrate them, as for example:

- Diagnostic and treatment processes can have high mental and physical risks for

the patient and therefore must be conducted carefully and with strict safety requirements [19].

- Patient care processes are not very predictable with respect to the sequence of the activities and their results.
- The patient, as the customer of the hospital, is directly involved in the process of “production” in contrast to industrial processes. To achieve a good treatment result, close collaboration between patient, physician and other staff members is essential [17, 20].
- Because many different professional groups and organizational units are involved in the treatment processes, their requirements for coordination and tuning of the activities of patient care are significant [21-23].
- Furthermore, to ensure good results, precise definitions and alignments of the process are needed. This is particularly the case for the difficult to grasp “product” health [24].

In the third step, main weaknesses in hospital processes were analyzed to obtain further information about the relevant quality aspects. We mainly focused on publications of the Picker Institute that questioned more than 1.5 million patients in the world to identify the relevant problems and their frequency in patient care. In a study of 62,925 patients (from the USA, Great Britain, Switzerland, Germany, Sweden, and Norway) the following weaknesses were found to be the most frequent: “too little shared decision-making of patient and physician”, “too little explications of diagnostic tests and therapy”, “too little information of the prognosis and process of becoming healthy” [25].

On the basis analysis of the specific characteristics and weaknesses of hospital processes we integrated further quality aspects such as the “quality of contact between staff, patient and/or other customers”. Moreover a “good monitoring and controlling system” of the ongoing process is a necessary quality aspect to guarantee a “good execution” as well as “good results” of a hospital process. Afterwards, the quality aspects were defined in more detail (see Results).

#### 3.2 Which Criteria Are Relevant to Measure the Quality Aspects of a Hospital Process?

To answer this question, we first conducted a keyword-based literature search. Criteria were gathered from publications and textbooks that deal with the evaluation of processes and related topics such as “how to define quality” [26-28], “what are the specific characteristics of service or hospital quality” [29-31], and “what kind of dimensions are needed” [25, 32]. Additionally, evaluation criteria from the industrial sector were included (mainly from the fields of business management and business informatics). Special quality criteria for the evaluation of the core processes of patient care including the fields of quality management, medicine, working science and medical informatics were gathered.

In the second step, criteria from widely applied quality management systems (EFQM [33] and ISO 9001 [34]) and from systems applied in the hospital sector (KTQ [35] and JCAHO [36]) were included. These systems evaluate the existence of a systematic process management and assess how a hospital guarantees that its processes are continuously being evaluated and improved. They use quite a lot of criteria and indicators that are also relevant for the view on a single process and therefore were included.

Altogether more than 300 evaluation criteria were gathered. To aggregate them, the following procedure was carried out multiple times:

- 1) Criteria were picked out that had a high proximity in content but a different name, such as e.g., “fulfillment of financial requirements” and “being economical”. These were reduced to one criterion.
- 2) Specific criteria for patient care which referred to a special process were formulated in a more general way. For example, the evaluation item “the response time of the staff after the patient rang the bell was too long” (Picker inquiry [25]) was reformulated to “response time to inquiries by patient/customers being on time”.
- 3) Criteria on a more detailed degree were summarized and subordinated to more

general criteria. For example “treatment errors, wrong decisions, unnecessary double diagnostic or treatment efforts, delay of diagnostic or treatment efforts” were summarized and subordinated to the criterion “reliable, without complications/faults/defects”.

The criteria were finally classified and aggregated to 16 main criteria (see next chapter).

## 4. Results

### 4.1 Description of the Process Potential Screening

Based on the described method, the Process Potential Screening (PPS) contains two axes:

- axis I, comprising the different aspects of process quality, and
- axis II, comprising the criteria to measure the quality aspects.

The overall structure of the PPS, combining axis I and axis II, is presented in Table 1.

On axis I three main **quality aspects of hospital processes** were defined on the first level: “A1. the quality of the processes’ goals and achieved results”, “A2. the quality of the execution”, and “A3. the quality of the monitoring and controlling system”. These aspects were divided into sub-aspects, for example, the quality of the achieved results (A1.1) is divided into achieving results of “good or correct properties” (A1.2.1) in a “good/correct number” (A1.1.2) at a “good/correct point of time” (A1.1.3). The aspects were subdivided into three levels for all of the quality aspects except for the resources (A2.3) that were being subdivided into four levels, and the responsibility for the entire process (A3.1) that was not being subdivided further. Altogether, 30 quality aspects were defined on the most detailed level of the PPS. If a more detailed analysis is needed using the PPS, the sub-aspects of quality can be refined more precisely.

The multi-level aggregation of the quality criteria on axis II resulted in 16 **quality criteria** (C1-C16). Some of them entail various related facets, for example, C5: “fitting needs of involved persons”, “fitting needs of the concrete situation”, “is adequate”, “is suitable”, “is necessary”. Which facet is chosen depends on the process that is being evaluated. To provide an example: The question of whether the process activities fit the needs of the involved persons may play an important role in evaluating therapeutic and diagnostic decisions, as was discussed above. Using the same criterion for evaluating the application of information resources, the facet “is necessary” probably will be more relevant (e.g., in the case of documents that are only used because they have been in use for years without their usefulness ever having been questioned).

However, the different criteria and their facets together provide the answer to the question of which kind of hospital processes are of high quality or considered “good”. When choosing just one facet for each quality criterion, a “better” hospital process consists of elements that are “transparent and clearly defined” (C1), “standardized” (C2), “effective” (C3), “without complications and faults” (C4), “fitting needs of situation” (C5), “practicable, workable” (C6), “corresponding to the agreements with staff members or customers” (C7), “with a high degree of satisfaction” (C8), “oriented to the customer’s requirements” (C9), “conductive to staff’s health” (C10), “in agreement with laws and guidelines” (C11), “fulfilling ethical values” (C12), “without breaks and interruptions” (C13), “smoothly” (C14), “needing less time” (C15), and finally are “economical” (C16).

After having defined these quality aspects and criteria, it was necessary to determine which **combinations** are meaningful. For each of the 480 possible combinations (30 quality aspects on the most detailed level  $\times$  16 criteria) it was asked if a potential for improvement could be identified by evaluating the respective quality aspect using the respective criterion. Nearly 400 combinations were found to be sensible for finding improvement possibilities in a hospital process; there were only a few that

were not (e.g., human resources (A2.3) are not themselves “free of complications” (C4) – at least not with regard to the evaluation of business processes). Other combinations had to be removed because of the definition and partitioning of the quality aspects: Whether the results of the process are achieved “on time” (C15) is evaluated in the quality aspect “point of time the process results are completed” (A1.2.3) and not when considering the aspect “number and amount of results” (A1.2.2).

Because of this high number of relevant combinations, it was decided to construct the PPS as a matrix that shows the relevant criteria for each quality aspect. The complete matrix encloses one page. Therefore, it cannot be illustrated in this paper, but it is available from the author.

The high number of relevant combinations shows that almost all criteria are sensible for evaluating all quality aspects. This fact is noteworthy because present publications on process evaluations often name criteria as only being relevant for single elements of a business process. To provide an example: Financial viability is often exclusively named as a criterion for the quality of the processes’ result. But this view seems short-sighted: For a process result to be financially viable, the entire process input must fulfill financial requirements, and the process activities must also be carried out in an economical way.

According to the aim and scenario of the required process evaluation, all combinations, single quality aspects, or single criteria can be selected to evaluate the process.

### 4.2 How to Use the Process Potential Screening

The PPS offers several methods for the measurement, recording and interpretation of the results. In the simplest case the PPS matrix can only be used for carrying out the evaluation of a hospital process in a structured way. If the process is being evaluated by an individual, he or she can systematically observe the single process elements with the help of the criteria and aspects. In a group, the matrix can be used either only for helping the interviewer or moderator to for-

ulate relevant questions in a structured way, or it can be directly used by the group members themselves. This, however, assumes a careful explanation of the PPS to the group.

In formulating the questions to assess the quality criteria we suggest posing the following question: “Is the process element as *good* as possible?” where “*good*” has to be replaced by the respective quality criterion. For

example: “Is the number and sequence of process activities (A2.2.2) as *effective* (C3) as possible?” or “Is the contact point of patient and physician (A2.2) as *patient-oriented, pleasant and friendly* (C9) as possible?”.

**Table 1** The general structure of the PPS matrix: The quality aspects on axis I and the quality criteria on axis II form a matrix, indicated by the cross. The overall matrix contains 30 quality aspects (indicated by numbers <sup>1-30</sup>) and 16 quality criteria.

QUALITY ASPECTS – The hospital process should have (a) “good” . . . :		X	QUALITY CRITERIA – “good” means, the quality aspects should be . . .	
<b>A1</b>	<b>Goals and Results</b>		C1	transparent and clearly defined
A1.1	goals and purpose of results	C2	standardized, uniform, similar	
A1.1.1	characteristics/properties <sup>1</sup>	C3	effective, purposeful, of value, fruitful	
A1.1.2	number/extent <sup>2</sup>	C4	reliable, without complications / faults / defects	
A1.1.3	point of time <sup>3</sup>	C5	fitting needs of persons/ situation, adequate, suitable, necessary	
A1.2	achieved results	C6	practicable, feasible, workable	
A1.2.1	characteristics/properties <sup>4</sup>	C7	corresponding to the agreements with involved staff members, patients or other customers	
A1.2.2	number/extent <sup>5</sup>	C8	without complaints, with a high degree of satisfaction	
A1.2.3	point of time <sup>6</sup>	C9	patient or customer oriented, pleasant, friendly	
<b>A2</b>	<b>Processes’ execution</b>	C10	staff oriented, human, conducive to staff’s health	
A2.1	separation and integration	C11	in agreement with/fulfilling laws and guidelines	
A2.1.1	start and end point <sup>7</sup>	C12	in agreement with/fulfilling ethical values	
A2.1.2	relation to the core process <sup>8</sup>	C13	without breaks and interruptions	
A2.1.3	connecting-points with other processes <sup>9</sup>	C14	smoothly, without conflicts, compatible	
A2.2	process activities and contacts between staff, patient and/or other customers	C15	needing less time, being on time	
A2.2.1	goal, purpose, results, method of execution, time needed <sup>10</sup>	C16	economical, needing a minimum of resources	
A2.2.2	number, sequence, start and end point <sup>11</sup>			
A2.3	resources (persons, rooms, materials, information), for each of them*:			
A2.3.1	purpose/characteristics/ properties <sup>12-15</sup>			
A2.3.2	number, exten <sup>16-19</sup>			
A2.3.3	availability <sup>20-23</sup>			
<b>A3</b>	<b>Monitoring and controlling</b>			
A3.1	responsibility for whole process <sup>24</sup>			
A3.2	process monitoring			
A3.2.1	kind of efforts, execution, responsibility and results <sup>25</sup>			
A3.2.2	number and frequency <sup>26</sup>			
A3.2.3	reporting and communicating the results <sup>27</sup>			
A3.3	process controlling			
A3.3.1	type of efforts, execution, <sup>28</sup> responsibility and results			
A3.3.2	number and frequency <sup>29</sup>			
A3.3.3	reporting and communicating the results <sup>30</sup>			

\* The resources e divided into 4 different types: persons, rooms, materials and information. For each of them, 3 relevant sub-aspects are defined (A2.3.1 purpose, A2.3.2 number, and A2.3.3 availability) – so that altogether 4 x 3 = 12 quality aspects refer to the resources of the process.

It is beneficial to tailor the questions to the specific characteristics of the process, e.g., naming the doctor’s letter or the patient record as specific information resources instead of using the general term “information resources”. If the hospital process to be evaluated is known before the meeting of the project group, a questionnaire can also be drawn up on the basis of the relevant quality aspects and criteria. In any case, the PPS can be used by the person who is responsible or involved in the process, by a moderator, as well as other representatives of the target group (e.g., quality managers).

There are different methods to record results of an evaluation with the PPS. In the simplest case the involved parties exclusively name weaknesses of the process. These are written down, for example, near the corresponding process element in the flowchart (see Fig. 1). In this case it is important to evaluate all quality aspects and not only the illustrated ones. This way of measuring quality is a kind of dichotomous judgment: either there is a potential for improvement with respect to the com-

bination of the quality aspect and criterion or not.

Alternatively, the quality of the process can be evaluated in a measure of degree for each criteria and aspect. Therefore, using a uniform scaling method for measuring all quality criteria is suggested. We used a 5-point traffic light scale with the colors red, orange, yellow, light-green, and dark-green, where “red” stands for great potential (see Table 2). The expert carrying out the evaluation selects the color corresponding to his evaluation.

The aim of the PPS is not to gain a quantitative number representing the quality of a hospital process, but to identify weaknesses or benefits. If a quantitative or a more detailed analysis is required, indicators (such as the number of equipment failures or the personnel costs) can be integrated into the evaluation of the specific quality criteria. Furthermore, more detailed measuring instruments can also be included, for example, questionnaires to measure patient satisfaction (e.g. [37]).

### 4.3 First Evaluation of the Process Potential Screening in Case Studies

The PPS was tested in different reorganization projects and evaluation scenarios assessing the following ten hospital processes at a total of five hospitals: “patient admission”, “patient-treatment room allocation”, “multi-professional planning of patient treatment”, “order entry”, “post-mortem examination”, “emergency caesarean”, “management of operations”, “case analysis of treatment error”, “doctor’s round”, and “writing of the doctor’s letter (e.g., referral, letter of discharge)”.

The selected processes offer different application scenarios for testing the various measuring and evaluation methods of the PPS. The evaluated processes do not only differ in their content and purpose (e.g., communication, documentation, treatment processes), but also in their customers (e.g., employees, patients, general practitioners) and their degree of standardization (e.g., high: writing the doctor’s letter; low: multi-professional treatment planning).

**Table 2** Excerpt from the PPS evaluation of the process “management of operations” using the traffic-light-scale (●●●●○ red – orange – yellow – light green – dark green).

Evaluation of the process activity “meeting for planning and preparing of next day operations” as one step of the process “management of operations”		QUALITY – ASPECT	
	is the aspect so... ... as possible?	quality of goal, purpose, results, method of execution, time needed (A2.2.1)	quality of number, sequence, start and end point (A2.2.2)
C R I T	... effective, purposeful, of value, fruitful (C3)...	●●●●○ (+) the discussions of the meeting are important (especially discussing potential complications of an operation). (+) the meeting ensures that the needed information is available (e.g. the needed documents and pictures) (-) in every third meeting relevant information is missing, because patients have not yet been examined.	●●●●○ (-) the meeting often starts late (-) on Fridays the meeting often does not take place at all. On Friday the start time is set for 13.30, but at that time several of the staff members involved in the meeting are still doing operations.
	... fitting needs, designed to meet requirements, adequate, suitable (C5)...	●●●●○ (+) patients with anticipated complications are discussed first	●●●●○ (-) two involved physicians have another important meeting on their ward at the same time
A	... without complaints, with a high degree of satisfaction (C8)...	●●●●○ (+) the involved staff members support the structured way of carrying out the meeting	●●●●○ (-) if the meeting does not take place a much more effort is required for collecting the relevant information from the different professional groups before the operation is started

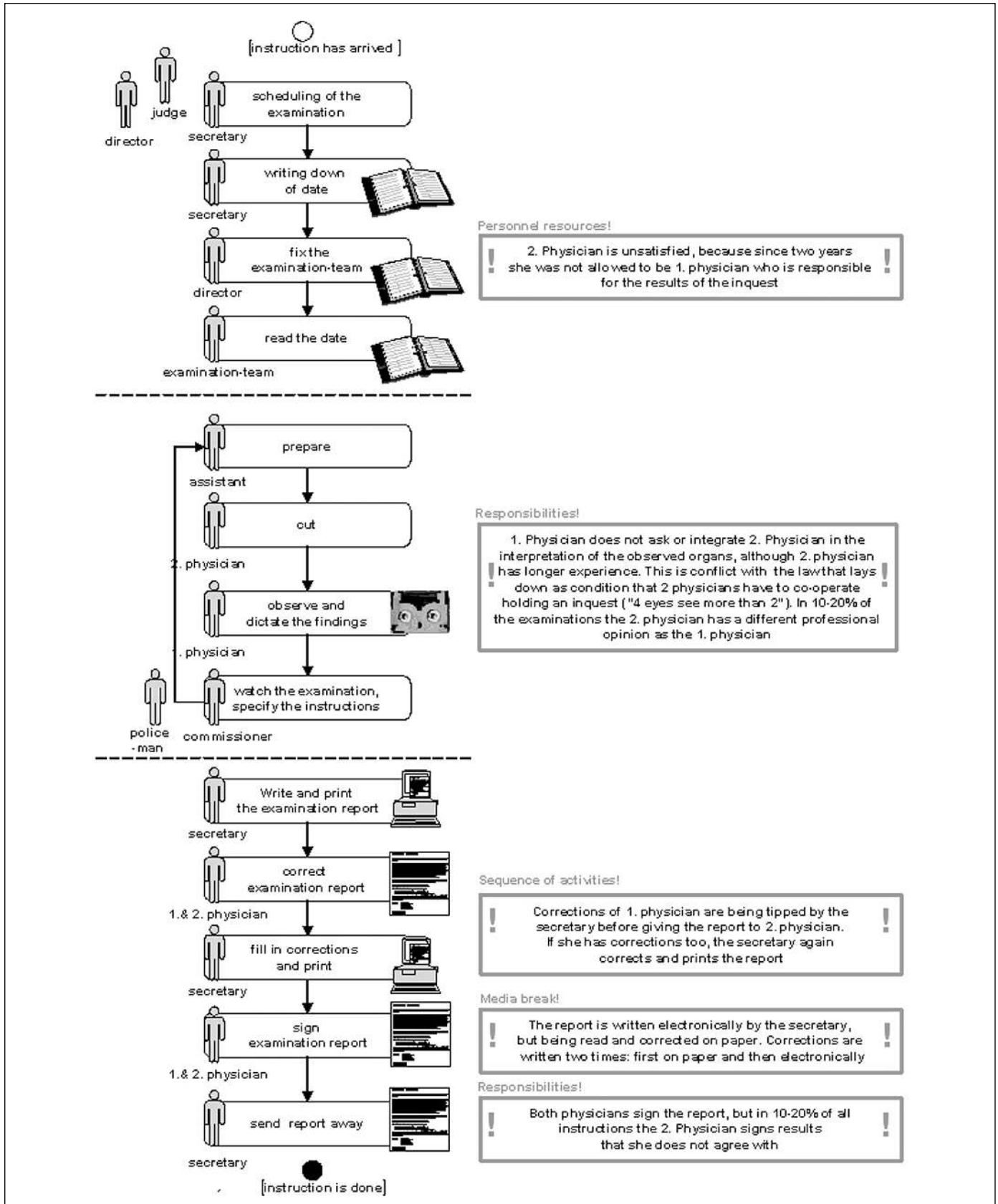


Fig. 1 Flowchart of the process "post-mortem examination" with possible improvements listed next to the activities

**Table 3** Excerpt of the PPS evaluating the process “writing the doctor’s letter” before (left side) and after (right side) reorganization of the process (●●●●○ red – orange – yellow – light green – dark green).

	BEFORE reorganization	AFTER reorganization
<b>A1.2 Quality of the achieved results</b>		
A.1.2.1 Are length, contents and structure of the sent doctor’s letters... ...standardized, uniform, similar? (C2)	●●●●○	●●●●○
...complete, short, with high clarity, correct and not contradictory? (C3)	●●●●○	●●●●○
...corresponding to the agreements with involved staff members? (C7)	●●●●○	●●●●○
...without complaints, with a high degree of satisfaction? (C8)	●●●●○	●●●●○
...in agreement with data protecting restrictions? (C11)	●●●●○	●●●●○
<b>A.2.3 Quality of information resources</b>		
A.2.3.1 Are media resources and structure of information resources ...fitting needs, designed to meet requirements, adequate, suitable? (C5)	●●●●○	●●●●○
...without breaks and interruptions? (C13)	●●●●○	●●●●○
A.2.3.3 Is the availability of information resources... ...fast and at the right point of time? (C3)	●●●●○	●●●●○
...safe and without unwanted access? (C11)	●●●●○	●●●●○

The PPS was used for evaluating processes both in their planning phase and in their execution phase. In one case study the PPS was used to compare the quality of a process before and after reorganizing it: In a project to improve the writing of the doctor’s letter, the existing process was evaluated. Numerous possible improvements were identified by the involved employees, including some that the employees were not aware of previously (for instance that the content of the letter did not fit the customer’s need, that being the general practitioner). After this analysis several variants for an improved process were developed by the task force. These variants were again compared with each other using the PPS. Different indicators were included in the measurement, such as the frequency of media breaks and editor’s changes. Table 3

shows an excerpt of the PPS which compares the process before and after reorganization using the traffic light scale.

The time needed for the application of the PPS to evaluate a process varied dependent upon the goals and the methods used for its application, complexity of the process, number of the group members and discussions, and question of whether the process was also modeled during the evaluation. In most cases the evaluation of the process with the PPS could be accomplished within one meeting which lasted between 15 and 30 min. The shortest evaluation needed 10 min (process “post-mortem examination” that was highly standardized), the longest ones lasted 45 min (processes “case analysis of treatment error” and “writing of the doctor’s letter”). Hereby it should be considered that the activities of describ-

ing the process, evaluating it, and discussing the identified improvement potentials often were done simultaneously. Altogether 15 staff members joined the case studies, whereas three evaluations were conducted by a group and four by an individual staff member.

The current set of applications is not sufficient to carry out a systematic and representative evaluation of the PPS. As an initial indication of quality, all 15 employees involved in the case studies were asked to judge the PPS (e.g., with regard to the extent of the relevant potentials that could be identified, plausibility of the matrix structure, understanding of the questions, time needed for the analysis). In summary, positive feedback was gained through the use of the PPS. In all case studies, relevant possibilities for improving the processes could be identified. All involved staff members commented to be “entirely content” or “very content” with the application of the PPS.

The non-specifically formulated quality criterion “without complaints/with a high degree of contentment” was found to be well suited at the beginning of a processes’ evaluation. It offered a good perspective on relevant weaknesses which could then be analyzed more thoroughly. Alternatively, weaknesses which had not been identified in the detailed evaluation of the quality criteria could be obtained by placing this criterion at the end of the questionnaire. According to the feedback of several staff members the practicability of the PPS could be improved if some facets of the quality criteria were formulated in everyday language. (Note: German has been the language used in all of the studies so far.) Limits of the PPS arose with the identification of interpersonal conflicts as a weakness of a hospital process.

## 5. Discussion

As a result of this project the Process Potential Screening (PPS) instrument was developed as a matrix containing aspects and criteria of the quality of hospital processes.

## 5.1 Discussion of the Structure and Quality Criteria of the PPS

The 16 quality criteria were defined by a systematic literature analysis. The case studies showed that the criteria seem to be sensitive for finding relevant weaknesses in the ongoing processes – even those that staff members were not aware of before the evaluation. According to the first case studies, the criteria illustrate substantial quality facets.

But the studies also showed that the PPS quality criteria can overlap and are not distinct. To provide an example: High mental distress in employees can also be reflected in the criterion “conducive to health” (C10) and in the criterion “without complaints, with a high degree of satisfaction” (C8). Overlap is unavoidable because the PPS evaluates different process elements, e.g., the results and the execution in the same analysis. Weaknesses that occur in individual elements of a process often result in weaknesses in other process elements. Therefore, the defect of an x-ray apparatus can result in high waiting periods, which results in a high volume of complaints from patients and the burden on the staff. In our opinion overlapping criteria are not a fundamental problem of the PPS, because the purpose of the PPS is to identify possibilities for improvement in all variations. Besides, if different effects of a weak point are illustrated with the PPS, this can help to find relevant patterns of causes and effects of the weaknesses.

## 5.2 How Does the PPS Take into Account the Specific Characteristics of Processes in Hospitals?

The advantages of the PPS are that there is much scope for adapting it to specific conditions in the individual hospital and that it can be applied to all business processes in the hospital.

Even if the criteria are formulated in a general way, we attempted to illustrate hospital-specific characteristics of processes. For example, the specific characteristic that patients are not only consumers but “pro-

sumers” of the treatment results is reflected in the fact that three of the 16 criteria directly refer to a patient- or customer-related view of the process. Following the SERVQUAL-dimensions of process quality [30] we differentiate between patient-oriented decision making with regard to the processes’ goals on the one hand, and a patient-oriented execution of the process on the other hand. A high reliability of treatment decisions between physician and patient is essential to hospital quality because the treatment processes can hardly be standardized and usually require individual adjustments during their execution.

## 5.3 What Has to Be Considered with Regard to the Application of the PPS?

The PPS offers several methods for carrying out the processes evaluation. If the analysis is done by a group of staff members one has to consider that the coordinator has to be competent in presentation and moderation. Furthermore, the PPS is an “expert-oriented” procedure in another sense: It has to be adapted to the specific process, before or during use. Therefore, its application assumes good knowledge of the contents of the procedure.

## 5.4 What Are the Next Steps after Having Identified Improvement Possibilities?

The PPS is an instrument to identify possibilities for improving a process. But, of course, the all-embracing aim is to improve the process. Therefore, in a next step, improvement possibilities must be described, analyzed, and converted into an improved process. Different instruments from the quality management field support these activities. If the traffic light scale is used, application of the PPS already highlights the most important weaknesses. For a further and/or more differentiated prioritization, methods such as the “nominal group technique” [38] can be used. Reasons and causes

for weaknesses can be derived by using an Ishikawa diagram [10]. In addition, the improvement possibilities identified with the PPS can be merged into a Failure Mode and Effects Analysis (FMEA) [39], which offers possibilities to reduce process risks.

## 6. Conclusions

The Process Potential Screening has been developed to gain an instrument for a systematic analysis of hospital processes. In contrast to other instruments and techniques used for analyzing processes, the PPS refers both to the processes results and its execution and offers a matrix containing process elements and criteria needed for the evaluation of hospital processes. The screening character of the PPS is reflected by the fact that both improvement potentials as well as weaknesses of a given hospital process are being achieved within a duration of only 15-30 min. PPS offers several methods for the measurement, recording and interpretation of the results that can be adapted to the specific hospital process and to the aim of the evaluation. The price for the high adaptability of the PPS is that its use requires good knowledge of its application. Whether time and effort required for training in the PPS are justified compared to the benefit of a systematic evaluation of hospital processes, needs to be clarified in further evaluation studies.

In the initial testing of PPS on ten hospital processes the involved employees commented positively on its application. These results must now be validated through a broader application of PPS by representatives of the target group (e.g., quality managers, process owners or involved staff members, medical informatics scientists).

The identification of possibilities for improving hospital processes is an essential task to achieve “better” processes on the way to a “better” hospital. Nevertheless, we do not see this as to maximize the performance of the processes according to the motto “faster, higher, better”, but to organize hospital processes according to the perspectives and needs of patients and staff.



## References

1. Russell JP. Quality Management Benchmark Assessment. Milwaukee, USA: ASQ Quality Press; 1997.
2. Harrington HJ, van Nimwegen H, Esseling EK. Business Process Improvement Workbook: Documentation, Analysis, Design, and Management of Business Process Improvement. Columbus: McGraw-Hill Companies; 1997.
3. Greiling M, Hofstetter J. Patientenbehandlungspfade optimieren – Prozessmanagement im Krankenhaus. Kulmbach: Baumann Fachzeitschriftenverlag; 2002.
4. Kaplan RS, Norton DP. The Balanced Score Card – Measures that drive Performance. Harvard Business Review 1992; 70 (19): 71-9.
5. Kaplan RS, Norton DP. Translating Strategy Into Action – The Balanced Score Card. Boston, MA: HBS Press; 1997.
6. McKeon T. Benchmarks and performance indicators: two tools for evaluating organizational results and continuous improvement efforts. J Nurs Care Qual 1996; 10 (3): 12-7.
7. Rosenthal GE, Way LE, Shipley SA, Doner D, Wojtala B, Miller J, Harper DL. Using Hospital Performance Data in Quality Improvement: The Cleveland Health Quality Choice Experience. Jt Comm J Qual Improv 1998; 24 (7): 347-60.
8. Haux R, Ammenwerth E, Herzog W, Knaup P. Health care in the information society. A prognosis for the year 2013. Int J Med Inform 2002; 66; 3-21.
9. Schwegmann A, Laske M. Istmodellierung und Istanalyse. In: Becker J, Kugeler M, Rosemann M (eds.). Prozessmanagement. Berlin, Heidelberg, New York: Springer; 2000. pp 121-52.
10. Brassard M, Ritter D. The Problem Solving Memory Jogger. GOAL/QPC; 2000.
11. Gierhake O. Integriertes Geschäftsprozessmanagement. Braunschweig, Wiesbaden: Vieweg & Sohn Verlagsgesellschaft; 1998.
12. Riekhof H. Die Idee des Geschäftsprozesses: Basis der lernenden Organisation. In: Riekhof H (ed.). Beschleunigung von Geschäftsprozessen. Stuttgart: Schäffer-Poeschel Verlag für Wirtschaft; 1997. pp 7-28.
13. Stauss B. Augenblicke der Wahrheit. In: Bruhn M, Stauss B (eds.). Dienstleistungsqualität. Konzepte, Methoden, Erfahrungen. Wiesbaden: Gabel Verlag; 2000. pp 379-99.
14. Rawlings K. Making it work. Process improvement in medical practices. MGMA Connex 2004; 4 (4): 42-51.
15. Büssing A, Herbig B. A work psychological evaluation of the program PIK. In: Victor N, Blettner M, Edler L, Haux R, Knaup P, Pritsch M, Wahren-dorf J, Windeler J, Ziegler S (eds.). Medical Informatics, Biostatistics and Epidemiology for Efficient Health Care and Medical Research – Contributions from the 44th Annual Conference of the GMDS. Heidelberg: Medizin & Wissen; 1999. pp 232-3.
16. Blendon RJ, Schoen C, Donelan K, et al. Physicians' view on quality of care: a five-country comparison. Health Affairs 2001; 20 (3): 234-43.
17. Eichhorn S. Integratives Qualitätsmanagement im Krankenhaus. Stuttgart, Berlin, Köln: Kohlhammer; 1997.
18. Kaltenbach T. Qualitätsmanagement im Krankenhaus. Melsungen: Bibliomed; 1993.
19. Ball MJ, Douglas JV. Redefining and Improving Patient Safety. Methods Inf Med 2002; 41: 271-6.
20. Donabedian A. Explanations in Quality Assessment and Monitoring. The Definition of Quality and Approaches to its Assessment. Ann Arbor; 1980.
21. Bricon-Souf N, Beuscart R, Renard JM, Geib JM. An asynchronous co-operative model for co-ordinating medical unit activities. Comput Methods Programs Biomed 1997; 54 (1-2): 77-83.
22. Timpka T, Nyce JM. Dilemmas at a primary health care center: a baseline study for computer-supported cooperative health care work. Methods Inf Med 1992; 31 (3): 204-9.
23. Köster C. Medizinische Versorgungsketten – Ihre Wirkung als Informationsverbundsystem am Beispiel der Initiative "Gesundheitsnetzwerk Rhein-Neckar-Dreieck". In: Herrmann G, Haas P, Kuhn K, Prokosch U, Schmücker P, Köhler CO (eds.). Praxis der Informationsverarbeitung im Krankenhaus. Landsberg: ecomed; 1998. pp 25-30.
24. Yank G. Quality improvement in health care organizations. A general systems perspective. Behavioral Science 1995; 40: 85-103.
25. Coulter A, Cleary PD. Patient's Experiences with Hospital Care in Five Countries. Patients' assessments of hospital care are essential to improving its quality. Health Affairs 1988; 20 (3): 244-52.
26. Bruhn M. Qualitätsmanagement für Dienstleistungen. Berlin, Heidelberg, New York: Springer; 1997.
27. Hildebrand R. Das bessere Krankenhaus. Total Quality planen, umsetzen, managen. Neuwied, Kriftel: Luchterhand Verlag; 1999.
28. Meyer A, Blümelhuber C, Pfeiffer M. Der Kunde als Co-Produzent und Co-Designer – oder: die Bedeutung der Kundenintegration für die Qualitätspolitik von Dienstleistungsanbietern. In: Bruhn M, Stauss B (eds.). Dienstleistungsqualität. Konzepte – Methoden – Erfahrungen. Wiesbaden: Gabler; 2000. pp 49-70.
29. Zeithaml VA. How Consumer Evaluation Processes Differ between Goods and Services. In: Donnelly JH, George WR (eds.). Marketing of Services. Chicago: American Marketing Association; 1981. pp 186-90.
30. Babakus E, Mangold WG. Adapting the SERVQUAL Scale to Hospital Services: An Empirical Investigation. Health Services Research 1992; 2: 767-86.
31. Parasuraman A, Zeithaml VA, Berry LL. A Conceptual Model of Service Quality – an Ist Implication for Future Research. Journal of Marketing 1985; 41-50.
32. Donabedian A. An Exploration of Structure, Process and Outcome as Approaches to Quality Assessment. In: Selbmann K, Überla K (eds.). Quality Assessment in Medical Care. Gerlingen: Beiträge zur Gesundheitsökonomie; 1982; 15: 69-92.
33. European Foundation for Quality Management (EFQM). EFQM Excellence Model Public Sector and Assessing for Excellence. Brussels, Belgium: European Foundation for Quality Management; 2000.
34. International Organization for Standardization. ISO-Standard 9001:2000 Quality Management Systems; Berlin: Beuth Verlag; 2001.
35. Deutsche Krankenhausgesellschaft. Kooperation für Transparenz und Qualität im Krankenhaus: KTQ-Katalog 4.0, Deutsche Krankenhausgesellschaft; 2002. <http://www.ktq.de>.
36. Joint commission for accreditation for healthcare organizations (JCAHO). 2004. Last accessed: <http://www.jcaho.org>.
37. Cleary PD, McNeill BJ. Patient Satisfaction as an Indicator of Quality Care. Inquiry 1988; 25: 25-36.
38. Delbecq AL, VandeVen AH. A Group Process Model for Problem Identification and Program Planning. Journal Of Applied Behavioral Science 1971: 466-91.
39. Beauregard MR, Mikulak J. The Basics of FMEA. New York: Productivity Press; 1996.

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