Comprehensive assessment of general practitioners : a study on validity, reliability and feasibility

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door

Paul Ram

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Preface

Are you looking for doctors' strengths and weaknesses in order to plan quality improvement activities as effectively as possible? No problem, comprehensive assessment is the panacea, by which you can evaluate your improvement activities as well! Comprehensive assessment you say? But what do you want to assess and why? The doctor's knowledge, skills or actual performance? And...which aspects of that broad domain of general practice care? Doctors' communication with patients, medical performance or their practice management? And how, how much and where? By the way, who are the assessors? Questions, questions, questions! You better help me to find the answers!

Use knowledge tests, assessor, they are relatively cheap and feasible for use on a broad scale. Thank you, but that doesn't comply to my request. I need information about doctors' skills as well! Alright, observe doctors in a simulated standardized surgery. That enables a fair comparison of doctors' skills: they all met the same patients bringing in the same cases in the very same situation. That's a fine idea! But how many consultations do I have to include? What is a fair assessment anyway? A valid and reliable one? But what is valid? By nature these simulated surgeries are unnatural! Do you think practicing doctors will accept the results of such a method? Doctors' performance in such a setting might be quite different from actual performance in daily practice. By the way, simulated surgeries require high resource investments. I don't have the money, do you?

Okay, let me think. Yes, we do have an alternative. Let's start to assess doctors' practice management. A good management is associated with good care! So, improvement of doctors' practice management will result in better care directly. Are you sure? How weak or strong is the relationship between the doctor's quality of medical and communicative performance on the one hand and the quality of his practice management on the other?

No, I'm not sure. Therefore, we have to observe daily surgeries. We will open doctors' "black box" by video registrations. That's it, we will enter real life! Great, okay. But, do patients agree? And real surgeries are not standardized, all patients are different and present different problems. Moreover, I want to assess the consultations as a whole. Is that possible, I mean to observe physical examination?

You're driving me crazy! Okay, we do everything: knowledge tests, observation of simulated and real surgeries and the doctor's practice management as well. We analyze all psychometric aspects, such as validity, predictive values, reliability, generalizability, acceptability and feasibility!

You're kidding! No, I'm not. I grant the money and you will answer all those questions in a thesis.

So I did. Now it's your turn. You have to read this book, in which all questions have been answered, except for

Acknowledgement

My name is a synonym for many people who worked with me on this thesis: professionals, patients and volunteers, lovers and friends. I like to thank everyone for his or her contribution by quoting a referee of *Academic Medicine* : "a great piece of work!".

- * Over 150 GPs showed their readiness to be assessed realizing a fantastic response rate.
- * Over 5000 patients trusted our organization by giving informed consent.
- * Thirty-five GPs observed near to 100 consultations each without loosing videotapes, scoring lists or their minds.
- * Over 2000 real patients filled in "the patients' evaluation of communication". The standardized patients did the same and they presented their complaints very consistently.
- * Over 100 practice assistants worked at the desk on the informed consent procedure, while taking care of the patients' questionnaires and being of assistance for all visiting consultants.
- * Practice consultants visited over 100 practices and gathered many data on practice management.
- * The electricians installed the video-equipment into the practices, making consultations observable and taking care of the transport of the videotapes from the practices to the university.
- * The MEMIC, which entered over 50.000 data on GPs' performance.
- * The Dutch Government, which subsidized this great project.

Synonym isn't a synonym for anonym, so I want to call some supporters by their names:

- * Jacques van Thiel and Jan van Dalen, the authors of the scoring list MAAS-Global, adjusted the list for observation of consultations both in daily practice and simulated surgeries.
- * Pieter van den Hombergh and Jolanda van Haaren and "their" Visitation Instrument for Practice management (VIP) enabled me to study the relationship between process and structure.
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- * Dear Hanneke and dear Koen, invisible members of this perfect team, thanks for all!

Introduction

Past twenty years, quality of care has evolved into a new important field of work including quality management, which involves both quality assessment, i.e. the process of evaluating the current level of performance, and a process of change and improvement.¹ The assurance that good quality is maintained requires continuously repeating the process of assessment and improvement.² Ideally, quality improvement in general practice means continuous and systematic activities integrated in normal practice care, visible for all other parties in health care (insurance companies, health authorities and the public) as a firm demonstration that general practice is taking quality seriously.³ In the Netherlands, legislation will change in order to guarantee the quality of care.⁴ Therefore, implementation of systematic quality assessment is a priority for many professional organizations and policymakers in general practice. In addition, assessment of practising General Practitioners (GPs) enables doctors to plan medical education on actual needs and deficiencies rather than on personal preference. The subjective needs of doctors tend to match personal interests and specific experiences.⁵ Therefore, objectively collected information should increase knowledge of strengths and weaknesses in general practice care, which can subsequently be used for educational, certification and recertification purposes.⁶ Only such an assessment can provide a minimum guarantee to the public and policymakers that physicians are competent and can serve as a vehicle for quality improvement.⁷ Although the idea of formal assessment and reassessment of practising GPs is becoming an accepted fact, a formal assessment procedure which enables a systematic, valid, reliable and feasible assessment procedure for practising GPs is yet lacking in most countries in Europe.⁸⁻¹² Isolated non-comprehensive assessment activities may fail to cover the extensive domain of general practice care. Moreover, the implementation of different assessment methods, which are not linked to each other, may hamper the integration of results and effective feedback. In this way, assessment may not lead to a systematic quality improvement.

This thesis focuses on the development and integration of different methods to be used in a comprehensive assessment procedure for practising GPs. Priority will be given to comprehensive assessment and its basic psychometric characteristics, such as validity, reliability, feasibility and the predictive value of methods used for actual performance. The educational impact, i.e. the influence of the assessment on GPs' educational activities, will be taken into account as well. In this educational study, aspects of health services research or, for example, epidemiological issues or other research concerning quality of care, have been left out of consideration.

Important assessment issues in medical education and their implications will be discussed in this introduction, followed by other chapters presenting results of research on psychometric characteristics, conclusions and recommendations for research.

Issues to be followed in the implementation of assessment procedures

The development and implementation of valid, reliable and feasible assessment can be operationalized as a series of steps to be followed:¹³

1. definition and selection of the clinical problems and clinical tasks to be addressed
2. development and selection of assessment methods, such as written tests, orals or direct observation tests and concurrent scoring issues, such as checklists, scoring keys, and scales
3. logistics of test administration as regards number of candidates, resources and time available
4. feedback to the participants, the levels of score details and their interpretation

These prerequisites for implementation of assessment procedures will be discussed in some detail.

1. Definition and selection of the clinical problems and tasks to be tested

An important phase in developing an assessment procedure is the definition of what has to be tested, assuming that the purpose of the assessment has been determined. This definition forms the basis for evaluating the content validity.^{14,15} The approach to determining what needs to be tested consists of three activities. First, the aspects of care the GP should be able to handle must be identified. Second, for each problem the clinical tasks in which the GP is expected to be competent should be defined. In different countries these activities have resulted in job descriptions, consisting of analyses of the functions and tasks most critical for health care in the setting of general family practice.¹⁶⁻¹⁸ The third activity consists of the development of a framework to be used as a blueprint for the selection of problems to be included.¹⁹

In relation to practising GPs, the question arises whether any model can represent the "state of the art" in general practice care as well as can cover the extensive and complex domain of general practice care, including "process" and "structure" aspects leading to desired patient outcomes.²⁰ Such a blueprint should represent recent developments in clinical management of patients and recent insights in communication and problem-solving strategies, and should include all dimensions of practice-management organization. It is obvious that no single assessment method can cover all these aspects: therefore, a blueprint for a comprehensive assessment approach is needed.^{21,22}

2. The development and selection of test methods

A wide variety of assessment methods is available, resulting in the need to select appropriate methods for each aspect of general practice care to be assessed.²³ Methods should be suitable for use in regular continuing medical education and quality improvement strategies in order to make the procedure as effective as possible.^{24,25} Defining the conditions under which the assessment will be conducted is required. Will the assessment take place in the clinical practice, in a simulated situation, or by means of indirect tests, such as written papers?

Assessment methods can be divided in competence-based and performance-based tests.²³ Competence concerns doctor's knowledge (knows) and capability of doing (shows), whereas performance has been defined as what a doctor is doing in his day-to-day practice (does).^{26,27} Written tests, i.e.

self-assessment tests and knowledge tests, and direct observation of doctors in a simulated test condition using standardized patients represent competence-based tests.^{28,29} Observation of doctors' regular surgeries, practice organization and assessment of data gathered from daily practice, such as data on referrals and prescriptions, are performance-based tests.³⁰⁻³²

Since considerable experience has been gathered with competence-based assessment methods in undergraduate curricula and vocational training, it is tempting to use these methods for assessment of practising GPs. However, practising GPs are different from medical students and GP trainees: experienced GPs have developed their own working style, they take care of relatively stable patient populations and they usually "manage" their own practices.³³ In addition, recent insights into medical expertise show a distinction between novices and experienced GPs. Medical students have to acquire knowledge and skills, whereas experienced doctors include facts related to the context, e.g. the medical and individual history of the patient.³⁴ Recognition and interpretation of these contextual factors determine the diagnostic accuracy of practising GPs.³⁵ These aspects should be taken into account in the process of defining and selecting clinical tasks to be addressed, and in selecting concurrent assessment methods as well. Therefore, undergraduate assessment methods are not always suitable for assessment of practising GPs and the development of alternative methods is required.

Both the process between GPs and their patients (performance) and structure (practice management) contribute to patient outcome. Authentic assessment by direct observation of a GP's clinical performance in daily practice, including observation of his practice organization, is a very valid approach and may therefore be preferred over other methods in quality assessment.³⁶ However, observation of a GP's performance seems to be difficult to standardize and requires considerable resources. Tests using simulated clinical situations, on the other hand, can be standardized, but involve high cost as well.³⁷⁻³⁹ Written knowledge tests pose less logistical and financial problems, but the predictive value of these tests for GPs' actual daily performance is questionable.^{10,40} Moreover, research aimed at determining whether competence-based observation methods using standardized patients do predict actual performance has resulted in conflicting evidence.⁴¹ The tenuous relationship between competence-based and performance-based methods as well as the need to cover a broad domain of patient care in general practice require the inclusion of different methods within an assessment procedure for practising GPs. Knowledge tests, competence-assessment using standardized patients at the medical school and assessment of actual performance by observation, using peer-observers and (standardized) patients to score performance may all have their place in such a "comprehensive assessment". The relationship between competence-based and performance-based methods within such an assessment should be analysed, in order to enable one to select the most valid, reliable and feasible methods using sound psychometric criteria for final assessment and reassessment procedures.

As mentioned above, the domain of general practice care is extensive and complex, including "process", "structure" and "outcome" aspects. "Process" refers to the GP's medical performance and communication with patients, concerning an infinite number of complaints and diseases of

patients. This is embedded in a practice management organization, i.e. the structure.⁴³ Process and structure ideally produce desired patient outcomes. However, the relation between process and structure, including the way in which these aspects attribute to a good patient outcome, is unclear, requiring further research.⁴⁴ Therefore, both actual performance and practice management should be assessed separately in a maximally comprehensive way. The problem in general practice is that good measures of outcome of care, i.e. the effects of care on patients, are difficult to devise. Many presenting symptoms never crystallize into recognizable clinical entities. Chronic conditions run their own course over long periods of time and many diseases are self-limiting, making it difficult to attribute a change in a patient's condition to single health care interventions.⁴⁵

Finally, technical issues such as making choices between checklists and rating scales, observation and (video) recording, and calculating case scores, should be taken into account. In relation to comprehensiveness and integration of different methods, the use of similar scoring lists and systems within different methods is preferred in order to allow these methods to be compared on validity and reliability. For example, regular consultations in daily practice and consultations in a simulated station examination should best be observed by using preferably the same scoring lists and scoring systems. Also for different knowledge tests similar answer formats are preferred. This will improve the power of the feedback to the candidates as well.

3. Logistics of test administration and procedures

Administrative problems, such as the need to test large numbers of candidates or limitations of time and resources, may lead to the adoption of test methods based on feasibility arguments rather than on validity aspects. Written tests, such as self-assessment tests and knowledge tests, may be preferred to performance tests. This may strengthen the risk that knowledge, skills and behaviours may be assessed in isolation rather than as an integrated performance construct, by which the GP has to handle complex problems as usually presented in general practice care.⁴⁵ On the other hand, if an assessment procedure focuses on validity and reliability only, without evaluating the logistics, i.e. the feasibility, the final assessment procedure cannot be implemented. Therefore, cost should be registered by keeping accounts and should be reported in detail in order to evaluate what resource investments will be required for the implementation of valid and reliable procedures.

4. Feedback to the participants

Assessment should lead to improved care for patients. So, appropriate and understandable feedback to the physicians assessed should provide an insight into necessary improvements and forms an important part of each assessment procedure. The interpretation of scores by the participants should be carefully guided by objective feedback. Special attention should be paid to the educational impact of both the assessment method and corresponding feedback. Feedback, on the other hand, may induce an order effect in comprehensive assessment: GPs' performance in one method may be influenced by previous assessment experiences within the same procedure. Analysis of the relationship between those methods may be biased by this order effect.

Research questions

In summary, this thesis focuses on the development and integration of different assessment methods to be used in a comprehensive assessment procedure for practising GPs, while taking into account the aspects mentioned above.

More specifically the following research questions are addressed:

1. What would be an appropriate model for comprehensive assessment of practising GPs, which covers the domain of general practice care as completely as possible?
2. To what extent do competence-based tests predict actual clinical performance?
3. What is the relationship between management in general practice (structure) and actual clinical performance of GPs in that practice (process)?

Methods and design

To address the research questions a study was conducted in three phases.

In the *first* phase, a literature search was carried out into models and blueprints for the comprehensive assessment of GPs. The desired blueprint was meant to cover the extensive domain of general practice care. Moreover, it had to take into account the difference between competence and performance and recent insights in medical expertise, recent developments in continuing medical education, quality improvement and assessment procedures in order to be as effective as possible. In addition, existing assessment instruments and methods were screened on their psychometric qualities (validity, reliability and feasibility) in order to select the optimal combination of instruments for the main study.

Consecutively, in the *second* phase, a new model for comprehensive assessment of GPs was constructed. Based on this blueprint competence-based and performance-based assessment methods and instruments were included in the main study: knowledge tests, direct observation of regular and standardized consultations as well as a practice visit to assess practice management.

In the *third* phase, the main study, a cross-sectional study was performed (see figure 1).

FIGURE 1. DESIGN OF THE MAIN STUDY

¹ Observers: peers and standardized patients

² Observers: peers and real patients

First, GPs in the south of the Netherlands were invited by letter to participate, 100 to be assessed comprehensively, 50 to serve as a control group and 35 to participate as peer-observers. GPs were sent a questionnaire, to be completed at home, concerning their personal and professional characteristics.

Second, two knowledge tests (paper-and-pencil tests) were completed by the participants at home: a General Medical Knowledge test and a Knowledge test on Technical Skills.

Third, after the written tests had been completed, a randomization was carried out in order to control for order effects caused by the design: three groups of 50 GPs each, two groups of participants and one control group, comparable on personal and professional characteristics and on results on the knowledge tests, were formed. In the following steps groups 1 and 2 were observed directly. Group 1 went first through the Multiple Station Examination, a real life-like surgery at the medical school, using eight cases presented by standardized patients. A few months later they went through the Practice Video Assessment. GPs of group 2 did the same but in reverse order: they started with the Practice Video Assessment and were then given the Multiple Station Examination. Consultations were scored by peer-observers, on both medical performance and communication with (standardized) patients. These patients participated as evaluators of the communication component as well.

In the final step (group 1) and in the one but final step (group 2), the practice management of GP-participants was assessed by trained non-physician observers using a practice visit. In this method, practice management is defined as "all aspects of the GP's task necessary to realize good operation of care, excluding clinical care or treatment of patients". GPs, practice assistants, patients and observers completed questionnaires and observation sheets before and during the practice visit.

At the end, participants were sent a questionnaire asking about the degree of their acceptance of each method and the educational impact of the methods including feedback, i.e. their plans and *actual changes in performance and practice management* induced by their participation in this study.

Structure of this dissertation

Chapter 1 (Comprehensive assessment of general practitioners: a theoretical and practical model) presents a new model for comprehensive assessment of practising GPs, taking into account the difference between competence and performance, current insights in medical expertise and recent developments in continuing medical education, quality improvement and assessment procedures, addressed in the literature.

Chapter 2 (Assessment of General Practitioners by video observation of medical and communicative performance in daily practice: issues of validity, reliability and feasibility) describes a method of direct observation of GPs' communication with patients and actual medical performance. Approximating the real professional performance as closely as possible, this video assessment in daily practice was considered as the criterion for all other assessment methods used in this study.

Chapter 3 (Assessment of practising family physicians: comparison of observation in a station examination using standardized patients with observation of real surgery in daily practice) compares the psychometric characteristics, i.e. validity, reliability and feasibility, including acceptance by GPs, of the video assessment procedure in daily practice and an assessment in a simulated situation at the medical school using standardized patients.

Chapter 4 (Assessment in General Practice: the predictive value of Written Knowledge Tests and a Multiple Station Examination for actual performance in daily practice) investigates the predictive value of medical knowledge tests for actual medical performance in daily practice and the predictive value of the Multiple Station Examination for actual medical performance.

In *Chapter 5* (Structure and process: the relationship between practice management and actual clinical performance in general practice) the relation between clinical performance (process) and practice organization (structure) is analysed.

Chapter 6 (General practitioners' communication with patients: assessment by peers, patients or standardized patients?) presents the results of the relationship between evaluation by peers and (standardized) patients' evaluation of GPs' communication with patients.

Chapter 7 (General discussion) summarizes the main conclusions including GPs' evaluation of the whole assessment procedure and discusses the points raised by this study on comprehensive assessment.

Aid for the reader

For those who do not wish to read the entire dissertation, it is possible to read chapters separately, since each chapter presents a complete study description in an article format. Because of the article format some repetitive information is inevitable.

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Chapter 1.

Comprehensive assessment of general practitioners: a theoretical and practical pyramid model.

Summary

Objectives. Assessment of General Practitioners (GPs) for reaccreditation and educational purposes requires a blueprint to guide the selection of problems to be included. Such a model should cover the extensive and complex domain of general practice care, including medical performance, communication with patients, and practice management. The aim of this study is to develop a blueprint for comprehensive assessment of GPs, taking into account recent views on medical expertise, the distinction between competence and performance, the state of the art in continuing medical education (CME), quality improvement and assessment methods.

Methods. Computerized and hands-on literature searches were performed, focused on collecting models, data and ideas, useful for the construction of an assessment model for practising GPs. A systematic review was not sought.

Results. Existing frameworks were transformed into a new three-dimensional pyramid. One axis represents the domain of general practice care: medical performance, communication with patients and practice management. On the second axis there is a clear distinction between competence on the lower levels, i.e. knowledge and skills, and performance at the top: actual communication and medical performance (both process) and practice management (structure) finally produce patient outcomes. Diseases and complaints, ordered according to chapters of the International Classification of Primary Care (ICPC), including contextual factors as important features, are represented on the third axis.

Conclusion. This model allows test developers to define precisely their objective for testing, i.e. what should be assessed, and where and how. For each of the domains and for each level different assessment instruments can be chosen. This model may facilitate an uniform and generally accepted blueprint for comprehensive assessment of GPs in Europe.

Introduction

There is consensus among licensing bodies that the assessment of general practitioners (GPs) at the end of vocational training requires regular follow-up assessments for reaccreditation and educational purposes during their professional career.^{1,2} Such assessments need not only to be valued as a minimum guarantee to the public that physicians are competent, but also as a major contribution to reaching higher quality of care for patients.^{3,4} For the assessment of practising physicians the same prerequisites hold as for assessment at undergraduate level: the methods should be valid, reliable, feasible and acceptable. "Validity" refers to the proposed content of the assessment: it should measure what it is supposed to measure. An important phase in developing an assessment procedure is the definition of what is to be tested, assuming that the purpose of the assessment has been determined. This definition forms the basis for evaluating the content validity.⁵ The approach to determining what is to be tested consists of three steps. First, the clinical problems the GP should

be able to handle must be identified. Second, for each problem the clinical tasks in which the GP is expected to be competent should be defined, and finally a blueprint to guide the selection of problems to be included has to be prepared.⁶ In different countries the first two steps have resulted in a job description, consisting of an analysis of the functions and tasks most critical for health care in the setting of general family practice.^{7,8,9} The development of a generally accepted blueprint is the next step. Such a blueprint should cover the extensive and complex domain of general practice, including recent developments in medical management of patients, e.g. new medical techniques, recent insights in communication and problem-solving strategies, and dimensions of practice organization. No single assessment method will cover all these aspects. A blueprint for a comprehensive assessment approach may therefore be more suitable.¹⁰

Moreover, it is necessary to define under what conditions the assessment will take place. Will the clinical practice be observed or a simulated situation, or will written papers or other indirect tests be used?¹¹ Since there is considerable experience with competence-based assessment methods in undergraduate curricula and vocational training, it is tempting to use these methods for assessment of practising GPs as well. However, practising GPs are different from medical students and GP trainees: experienced GPs have developed their own working style, they take care of a relatively stable patient population, and they usually manage their own practices.^{13,14} Some of these aspects are not addressed in undergraduate assessment methods, rendering these unsuitable for assessment of practising GPs.

In addition, GP assessment may be more effective when it is embedded in Continuing Medical Education (CME) and quality assessment.^{3,15} A model for the assessment of GPs might be more useful if it is in line with CME programmes.

Finally, after preparing a blueprint, test methods should be chosen and implemented.⁶ An insight in recent methods used in the health professions education is therefore required.¹⁶

The objective of this paper is to present an overview of these issues in order to present an up-to-date model for the comprehensive assessment for practising GPs. First, relevant frameworks used in general practice care and medical education are described. Second, a view is given of the competence, performance, and medical expertise of experienced GPs. Third, some important aspects of CME and quality improvement are highlighted. Fourth, recent developments of assessment methods are addressed. Finally, a new model is presented which reflects these issues. This model is proposed as a tool for further validity studies and for implementation of assessment in general practice. An example of application of this model in daily practice is presented.

Methods

Computerized searches were conducted of the relevant English-language literature on comprehensive assessment in general practice published between 1983 and 1997 with the help of Medline and Eric databases using the following keywords: performance, competence, assessment, blueprint,

model, family physicians, general practitioners, general practice and medical education.

Almost all articles retrieved describe the assessment of patients by doctors as regards patients' health state in relation to different diseases. Therefore, another strategy was added. Proceedings,¹⁷⁻²³ books and articles about assessment of clinical competence, CME and quality improvement were consulted. These methods focused on data useful for the construction of an assessment model for practising GPs. A systematic review was not the objective. Findings concerning existing frameworks, competence and performance CME and Quality Improvement and assessment methods will be presented and discussed to some extent.

1. Existing frameworks and models for assessment

Although much has been written about the competence of medical students, GP-trainees and GPs, recent attempts to systematically describe a model or blueprint for the comprehensive assessment of practising physicians seem to be lacking.

A classic framework for measuring quality has been described by Donabedian: the triad of structure, process and outcome.¹⁵ In this triad, structure describes the physical features of health care, emphasizing surgery premises, equipment, medical records and other aspects of practice management, whereas process refers to clinical interactions and communication between doctors and patients. The synonym for process is actual performance, defined as what a doctor is doing in daily practice in medical care and in communication with patients.²⁴ Outcome is defined as the changes in a patient's current and future health status that can be attributed to past health care. Good measures of outcome are difficult to devise, since many presenting symptoms in general practice never crystallize into recognizable clinical entities. Self-limiting and chronic multifactorial diseases may run their own course, making it difficult to attribute change in a patient's condition to single interventions by GPs and/or specialists. Therefore, assessment mainly focuses on structure and process. Fabb presented a three-dimensional cube with the axes: 1. clinical competencies, 2. intellectual skills, attitudes and manual skills and 3. skills in managing health problems in all age groups.²⁵ Each axis consists of 5 to 9 categories, so that over 200 atomistic aspects of general practice are distinguished. Using this model, the comprehensive assessment of GPs' competence may consist of a series of 15 different test formats, each test assumed to address (parts of) a specific "domain". In addition, Fabb decided to weight different tests in order to reflect the relative importance of the components of the assessment procedure.

This model is mainly competence-based. It does not reflect the distinction between competence and performance. For example, the domain of practice management has been described on the level of doctor's skills (capability, competence), not on the actual structure or organization of the practice. The third model is the "pyramid" of Miller.²⁶ In contrast to the aspect-dimensions of Fabb, Miller presented a concept-oriented approach. At the base of the pyramid there is the concept knowledge: a student or a physician "knows" what is required in order to carry out professional tasks effectively. To fulfill that broader objective, he or she must know how to use the knowledge in applied

situations ("knows how"), subsequently followed by "shows how": the demonstration of their competence when faced with a patient. Finally, after certification, a doctor works independently in a clinical practice ("does"). Miller pays considerable attention to standardized patients, the instrument of choice for the "knows" and "shows" levels. However, this model lacks the incorporation of general practice domains such as communication, medical performance and practice management. No descriptions are given how the "does" should be assessed.

Finally in literature many different terms have been used for similar concepts: domains and dimensions, skills and competence, practice organization and practice management. The development of a generally accepted blueprint for assessment of GPs is likely to be hampered by this language profusion. An international accepted glossary is needed.

We suggest dividing the domain of general practice care in three sub-domains: medical performance, communication with patients including GP's attitude, and practice management. The first two sub-domains together represent "process", the third represents "structure".

2. Competence, performance and medical expertise

The different ways of thinking about knowledge, competence, performance and expertise also need to be addressed when developing a blueprint.¹¹ Competence can be defined as the GP's capability to successfully perform series of discrete observable tasks in isolation from actual work and performance as what a GP is doing in his day-to-day practice while integrating these tasks.¹² Thus, competence can be defined as the capability of an individual to act at the required level in a given situation, whereas performance describes the actions of the individual when, in reality, confronted by this situation. This distinction is critical for general practice. The competent, however defined, does not always perform competently.^{24,27} Competence and performance should therefore both be included as different constructs in a blueprint for the assessment of GPs.

Descriptions of clinical competence of practising GPs have graduated from a traditional view, addressing competence as an accumulation of knowledge, skills and attitudes, relatively stable and distinct from each other,²⁸ to the current view today based on cognitive psychological literature, how and when physicians act professionally.^{29,30} In the development of professional expertise isolated facts are increasingly encapsulated into knowledge networks, to become condensed into patterns of signs and symptoms. This process is mostly the result of individual experience and clinical exposure, known as "illness scripts".³¹ Reasoning then is no longer needed to arrive at the right conclusion: in many cases the doctor compares new problems with those encountered before.³² The doctor includes facts related to the context, e.g. the medical and individual history of the patient.³³ Recognition and interpretation of these contextual factors determine the diagnostic accuracy of general practitioners.³⁴ These findings clarify that the process of acquisition and use of expertise is closely linked to actually seeing patients and their context. Any assessment of practising GPs, either written tests or direct observations, should include this view on medical expertise.

3. Continuing Medical Education and Quality Improvement

Continuing Medical Education (CME), such as reading, audit, research, teaching and discussion with colleagues, is essential to maintain up-to-date competence i.e. knowledge, attitudes and skills, in order to ensure the quality of health care.^{35,36,37} However, it has not been demonstrated that those methods influence doctors' actual performance, i.e. behaviour in practice.^{38,39,40} After reviewing 777 papers, Davis and his colleagues found 50 satisfactory randomized trials, of which only 18 studies showed any positive effect of CME on patient outcomes.⁴¹ No evidence of the magnitude of reported changes in doctors' performance was presented. The practical significance of these results is therefore questionable.⁴² However, the review also shows that CME is more effective when it incorporates practice-based enabling and reinforcing strategies (practice guidelines, feedback) and that adequate assessment of physicians' needs leads to increased potential for change.⁴¹ Further research is needed to ascertain which types of CME actually influence doctors' behaviour and improve the outcome for patients,⁴³ but practice-based strategies seem to be a fundamental requirement.

Quality Improvement is a complex of systematic and continuous activities including guidelines and goals for good performance, the assessment of actual performance and actions aimed at changing performance, when necessary.^{44,45,46} Real improvement in quality depends on evaluating and revising the production processes on the basis of data about the actual processes themselves.³

Both CME and Quality Improvement activities must have their focus on evaluation, i.e. assessment, of actual performance and data obtained from actual practice. A blueprint for the assessment of GPs should therefore be practice-oriented.

4. Assessment of professional competence and performance

Traditionally, medical assessment was based on the unstandardized apprenticeship model, accompanied in the 1960s by the widespread introduction of multiple choice questions (MCQs). However, according to the critics, selecting alternatives from a list of options is considered to be rather trivial and a poor reflection of clinical competence.⁴⁷ Therefore specific attempts were made to measure clinical reasoning ability or problem solving using written simulations of patient problems like the Patient Management Problem (PMP).⁴⁸ However, disappointing outcomes such as case specificity (a score derived from one problem was not very predictive for a score on another problem), and low construct validity (experienced clinicians scored hardly better than students; high correlations with MCQs were found) presented major practical and theoretical problems. New methods were introduced which assessed examinees in standardized live simulations of clinical situations using standardized patients, such as the Objective Structured Clinical Examinations (OSCE).⁴⁹ Aspects of problem solving, patient management, communication and attitude were measured as integral parts of clinical performance. However, case specificity, inherent in any assessment method, necessitated long testing time, a sampling of many stations and hence requiring considerable resources. Moreover, the predictive value of those methods for actual performance

remained questionable.¹² Finally, procedures for direct observation of GP-trainees and GPs by video assessment in daily practice have recently been developed.^{50,51}

A common denominator in all assessment developments is the progressive approximation of the real practice situation in the test situation, while maintaining standardized test-taking conditions.⁵² Although it is perhaps administratively more easy to test, for example, knowledge and skills separately and unrelated to practice context, it seems more useful to tailor assessment to practice situations, paying attention to the patient's contextual factors (risks factors, age, gender, medical and personal history) as important determinants of the GP's diagnostic accuracy.

We conclude that a model for GPs' assessment should cover the broad domain of general practice care, i.e. practice management (structure), communication with patients and medical performance (process). Assessment of patient outcomes needs further research. Secondly, we conclude that such a model should reflect the distinction between competence and performance, and the present view on medical expertise, focusing on the important role of contextual factors in actual practice. Finally, assessment procedures have developed from knowledge tests through written and live simulations to observation of actual performance and to analysis of data obtained in actual practice. CME and Quality Improvement are practice-oriented as well. Any assessment procedure of GPs should reflect these developments if it is to be comprehensive and effective.

A new model for comprehensive assessment of GPs

Although mainly focused on competence, Fabb's model has most systematically approached comprehensive assessment in general practice. In contrast to Fabb, Miller's pyramid reflects the processes of clinical reasoning and the distinction between competence and actual performance. However, domains to be assessed are not mentioned nor are assessment procedures.

We suggest combining both models in a new pyramid model in order to profit from their complementary benefits. The new model reflects: contextual factors as the general feature in medical expertise, the difference between competence and performance; the practice-oriented approach of CME, Quality Improvement and assessment procedures of the health professions.

This new three-dimensional model is presented in figure 1. As can be seen, the model builds strongly on Miller's pyramid, but there is clear distinction between competence (the three bottom lines) and performance (the top) on the vertical axis. Three sub-domains in general practice are represented on one axis: medical performance, communication with patients and practice management. Finally, diseases and complaints of patients, including contextual factors as important features of general practice, are represented on one axis as well, ordered according to chapters of the International Classification of Primary Care (ICPC).⁵³ Aspects of Fabb's approach such as patient categories have thus been included. Using this model, tasks related to the three sub-domains can be connected with different diseases and complaints of patients and

FIGURE 1. THE PYRAMID ASSESSMENT MODEL

their contexts, whereas the assessment level, i.e. competence or performance, can be indicated. The top has a symbolic intention too: actual communication and medical performance (both process) and practice management (structure) finally produce patient outcomes, the ultimate target for quality of care.¹⁵

Practical and theoretical use of the new comprehensive assessment model

In contrast to former models, this model allows test developers to define in advance precisely their objective for testing, i.e. what should be assessed, and where and how. For each of the domains and for each level the optimal assessment instrument can be chosen.⁴ The purpose of this model is to guide test developers in choosing very carefully the design of a comprehensive assessment.

A practical approach in using this blueprint is suggested in figure 2. The levels "knows" and "knows how" could be assessed by written tests and the "shows how" level by standardized tests in a laboratory such as an OSCE or a multiple station examination. Actual performance and practice management ("does") could be assessed by direct observation in daily practice and by practice visits. For each sub-domain, dimensions and sub-dimensions related to required tasks can be described. In this example, practice management is not assessed on the "shows how" level, as can be seen.

FIGURE 2. METHODS IN COMPREHENSIVE ASSESSMENT IN GENERAL PRACTICE

This model was presented and, to our opinion, well accepted at the 8th Ottawa Conference in Maastricht, the Netherlands (1996),²³ and at the seminar on the state of the art in "Educational assessment in general practice", organized by the European Academy of Teachers in General Practice (EURACT) in Bled (1997), Slovenia. Using this model, effective communication on this subject between representatives was supported.

Conclusion

Our model can be helpful in the systematic analysis of the relation between "structure and process". In this horizontal approach, the relation between different structural aspects as well as the relation between process aspects, i.e. communication and medical performance, can also be analysed. In the vertical approach the relation between knowledge, competence and performance can be studied systematically for each sub-domain. An analysis of the relationship between process and structure and between competence and performance may ultimately provide insight into the way these

factors contribute to outcome. Factors which contribute to outcome failures may be identified and localized more precisely. Finally, this model allows further analysis of the predictive value of knowledge tests, station examinations and aspects of practice management, such as data on medical records, presence and use of equipment, for actual performance. These issues are important in order to select adequate, valid, reliable and feasible assessment procedures in general practice.

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Chapter 2.

Assessment of general practitioners by video observation of communicative and medical performance in daily practice: issues of validity, reliability and feasibility.

Accepted by Medical Education as: Assessment of general practitioners by video observation of communicative and medical performance in daily practice: issues of validity, reliability and feasibility. Paul Ram, Richard Grol, Jan Joost Rethans, Berna Schouten, Cees van der Vleuten & Arnold Kester.

Summary

Objectives: To develop a video assessment method for General Practitioners (GPs) by analysing issues of validity, reliability and feasibility of observation of videotaped regular consultations.

Methods: In a cross-sectional study consultations of 93 GPs were video recorded in the practice during one week. The GPs registered consultation and patient data in a logbook; 16 consultations per GP were selected using preset criteria. The quality of communicative and medical performance of these consultations was assessed by GP observers with a validated instrument. The validity of the procedure was evaluated by checking the content of each GP's sample using specific sample criteria. Selection bias was estimated by multiple regression analysis, with sample characteristics as independent variables and scores on communication and medical performance as dependent variables. The influence of observation on GPs and patients was assessed by a questionnaire. Generalizability theory was used to estimate reliability. Feasibility was assessed by conducting a questionnaire, by keeping accounts, and by checking the technical quality of the videotaped consultations.

Results: The domain of general practice was well covered in the samples; content validity was satisfactory. As regards the sample characteristics, only the total duration of consultations appeared to correlate significantly with both the score on communication and the score on medical performance. A majority (71%) of GPs reported not being influenced by the observation, except in the first cases, and recognizing their usual daily performance in the videotaped consultations. An acceptable level of reliability was reached after 2.5 hours observation, i.e. 12 cases by a single observer. The method was well accepted by both GPs and patients. The costs were £ 250 per GP.

Conclusion: Video assessment of GPs in daily practice according to the procedures described is a valid and reliable method, one which is useful for education and quality improvement. There is a trade off between feasibility on the one hand and validity, reliability and credibility on the other. Compared to investments in observation methods in standardized settings, the costs of video observation of GPs' actual performance are acceptable.

Keywords: video observation, assessment, performance, general practice.

Introduction

Assessment of the performance of general practitioners (GPs) in daily practice can play an essential role in improving the quality of care GPs provide to patients. It has been shown that self-ratings of performance usually produce overestimation of service delivery, and that self-selected postgraduate education has little effect on changing practice behavior of doctors, objective assessment is preferred.^{1,2} If deficiencies in practice performance could be identified objectively, postgraduate medical education and quality improvement activities could be focused on GPs' insight into their deficiencies and real educational needs in order to make them as effective as possible.^{3,4}

It is uncertain which assessment method(s) should be used. Which have the highest validity and reliability, and which are feasible on a broad scale? One can distinguish between direct and indirect methods of quality assessment.⁵ With the former, clinical activities are observed directly. Indirect methods, on the other hand, infer clinical competencies from written or oral exams, from chart review, from assessment of referral letters or from data from insurance agencies. A direct method can be applied both in the day-to-day practice and in a laboratory setting. Direct observation of actual performance in daily practice has the highest validity, since this method approximates the real professional world as closely as possible.⁶ Direct observation is possible by having standardized patients (SPs) or peer observers visit the practice or by placing video-equipment in the practice. Although used in daily practice, SPs present logistic difficulties.⁷ It is demanding for SPs to observe the complex processes involved in medical care and communication. Practice visitation by peer observers may disrupt real practice and requires considerable resource investments. On the contrary, video recordings of consultations can be judged by different trained observers without consultations being disrupted; there are, however, problems concerning validity, reliability and feasibility.

Validity might be reduced by the "audience effect": both GPs and patients could be influenced by the video recording.⁸ Moreover, the logistics of performance testing often restrict the selection of consultations to be included into the assessment, thus incurring the risk that the sample may not be representative of actual patient care.⁹

Reliability might be influenced by the content specificity problem: for example, the predictive value of a mark, acquired with a case concerning cystitis to one dealing with angina pectoris turns out to be very low.¹⁰ Moreover, reliability could suffer from the unstandardized and complex problems as they are presented in day-to-day practice. The optimal management of a complex problem in a specific daily context may not be immediately apparent and experts may disagree in grading the quality of performance. A key issue yet to be determined is the duration of observation and the number and range of cases that need to be observed to give a reliable judgement of performance. Even under standardized conditions the testing time required to achieve an acceptable level of reliability appears to be a limitation of such an assessment method.¹¹

As for feasibility, both ethical, practical and technical aspects may limit the use of video assessment. Videotaping all aspects of the complex care process, including physical examination, may be difficult, while acceptance by the target group may be hampered by fear of abuse of tapes.¹² Also, there are no reports on the cost of video assessment. While various problems can thus be expected in applying video assessment in the practice of GPs, videotapes of daily consultations are already being used successfully, for example in the United Kingdom in the selective assessment of GP-trainees and in the Fellowship by Assessment of the Royal College of GPs.^{13,14} The latter has been revised recently to be more objective. However, issues concerning validity, reliability and feasibility need further investigation in order to support this method for both selective and educative purposes.

In order to investigate the problems mentioned above, a study was conducted focused on video assessment of both GPs' communication with patients and medical performance. The following questions were posed: how might consultations be identified and selected for a valid assessment; how reliable is video assessment considering the number of consultations and observers; how feasible is this method concerning technical aspects, logistics, costs and acceptance by GPs and patients?

Methods

Subjects and procedure

In a cross-sectional study, consultations of general practitioners were videotaped during one week in their own practice. All general practitioners in the south of the Netherlands were invited by letter to participate in this study; 220 (25%) were willing to do so. For budgetary reasons 135 GPs were selected randomly, 100 of them to be videotaped, the other 35 to act as peer observers to score performance. Personal and professional characteristics of the participants (see Table 1) were collected and compared to the national population of GPs to determine representativeness (T-test and Chi-Square test) and confounding.¹⁵

A video-observation system, consisting of two cameras with built-in microphone, a monitor and a recorder, was installed by trained electricians in each practice. All consultations were recorded both in the consulting room and the examination room. The GP was responsible for switching from one camera to the other when necessary, and for recording patient and consultation data, such as the patient's age and gender, (number of) complaints and duration of consultation (see table 2), into a logbook directly after the consultation. The receptionist informed patients about the video recording and asked permission. Consent was registered by giving the patient a coloured card (green = consent, red = no consent) to be handed to the GP at the start of the consultation. Video registrations were erased if patients revoked their permission.

Evaluation of validity

To achieve a satisfactory content validity, a blueprint for the practice video assessment was designed, based on prevalence of complaints and diseases in general practice and on a nationally accepted job description.^{16,17,18,19} With this blueprint ten specific criteria were formulated for selecting a representative sample of consultations per doctor for the final assessment (see Table 2).

TABLE 1. CHARACTERISTICS STUDY POPULATION (N=93) AND POPULATION DUTCH GENERAL PRACTITIONERS (N=6549) IN PERCENTAGES, EXCEPT FOR AGE

	study-population	Dutch GPs
gender : male	88	85
sole practice	44	51
college member	71	69
urban area	54	59
GP trainer/postgraduate trainer	55	n.a.*
age (mean, yrs)	43.1	44.3

*n.a. = not applicable

TABLE 2. SAMPLE CRITERIA FOR SELECTING CONSULTATIONS TO BE INCLUDED IN DATA ANALYSIS WITH PERCENTAGE OF SAMPLES WHICH MET THE CRITERION FULLY

sample criteria	samples in which criterion was fully met (%)
1. representativeness of ≥ 8 different ICPC chapters	100.0
2. the first 5 videotaped consultations not included	94.6
3. at least 8 cases with accepted guidelines	86.2
4. representativeness of 5 ICPC chapters with highest prevalence: D, K, L, R and S	71.3
5. at least 14 cases with duration ≥ 5 and ≤ 15 minutes / case	86.2
6. age distribution: youngest patient < 18 years and oldest patient > 65 years	84.0
7. gender heterogeneity: ≥ 6 and ≤ 10 female patients	72.3
8. at least 8 initial consultations, at least 4 follow-up consultations	70.2
9. maximum 2 cases with > 2 reasons for encounter	92.6
10. maximum 2 cases with only psychosocial problems	93.6

The first criterion, the selection of sufficient different cases, received highest priority in order to solve the case-specificity problem. Using logbook data 20 consultations per GP, 16 for direct observation and 4 as reserve, were selected per GP. This number was expected to offer sufficient content validity and observation time for analysis. Since it is known that scores from the first cases to be assessed are less reliable than later ones, the first five cases were not included.²⁰ Validity was evaluated by checking each GP's sample with the specific sample criteria. Furthermore, the influence of differences in sample characteristics of each GP on the performance scores was measured by a multiple regression analysis, with performance scores as dependent variable and sample charac-

teristics as independent variables. In this way the contribution of GPs' personal and professional characteristics to performance scores was also analysed. Influence of the observation on GPs and patients and feasibility aspects were assessed by a questionnaire for GPs, containing 20 structured questions (five-point Likert scale). GPs were asked to score questions about recognition of their "usual working style", after they had viewed the selected consultations.

Evaluation of reliability

Consultations were assessed for communication and medical performance by using the MAAS-Global scoring list.²¹ This instrument, containing 12 items on the quality of communication with patients and 4 items on the quality of medical performance, is based on literature related to effective communication between GPs and patients and on guidelines for medical performance. Items are case-independent and global, but anchored with detailed criteria. They are scored on a 7-point Likert scale (Figure 1 and appendix). An extensive list of criteria is available.²²

FIGURE 1. MAAS-GLOBAL: ITEM 8: PROVIDING INFORMATION

GENERAL COMMUNICATION SKILLS						
PROVIDING INFORMATION						
	0	1	2	3	4	5 6
announcement, categorizing						
in small amounts, concrete explanation						
comprehensible language						
asks about reaction and comprehension						
0 = absent 1 = bad 2 = insufficient 3 = doubtful 4 = sufficient 5 = good 6 = excellent						

Case scores were calculated by summing the item responses on the MAAS-Global for each case expressed as a percentage score. The mean score for the 16 cases, i.e. the sample, determined the total score of the participant GP. Scores were calculated for the two components: communication and medical performance, and for the overall consultation performance (communication score + medical performance score / 2). To estimate reliability, generalizability theory was used. This theory uses ANOVA procedures and variance component estimation to estimate "generalizability coefficients".^{23,24} For part of the data set - 25 GPs and 15 cases - cases were scored by pairs of independent peer-observers (raters). To avoid a Halo-effect, i.e. the tendency to rate a GP high (or low) in all areas being evaluated in a session if he or she scores high (or low) in one area, a maximum of 6 consultations per GP was assessed by the same rater. Because different raters were used for different daily practice cases, a "raters-nested-within-cases-within-persons" design was used, followed by variance component estimation.²⁵ This design allows a concurrent estimation of the reliability of raters and cases.

From the variance components generalizability coefficients were estimated; this enables projection of the reliability from the actual number of cases used to other hypothetical test conditions with different sample sizes (see table 4).

Evaluation of feasibility

Problems experienced by GPs and receptionists with the video installation, operating of the video equipment and the informed consent procedure were assessed by the "feasibility and influence on GPs" questionnaire. Furthermore, feasibility was measured by checking the technical quality of the videotaped consultations and particularly by checking the number of re-installations and spare consultations needed to complete the sample. Costs were calculated on the basis of accounts kept by all participants.

Results

Subjects and drop-out

Of 100 GPs seven (7%) dropped out before video observation on the grounds that "participation is too threatening" (1%) or that they were "too busy to participate" (6%). As regards professional and personal characteristics the study population (N=93) was representative for Dutch GPs in all respects, except for average age (Mean is 43.1, SD 5.5 respectively Mean is 44.3 years, SD 7.4; $t=2.03$; $df=92$; $p<0.05$, Table 1).

Validity

A minimum of 40 and a maximum of 95 consultations were recorded and registered in the logbooks by the participants. The number of videotaped consultations was related to the number of (patients per) surgeries during video recording. In the selection of 16 cases it was possible to meet criterion 1: in all samples (100%) eight cases from eight different chapters of the International Classification of Primary Care (ICPC)¹⁷ were included (Table 2). Thus, at least eight of all 17 ICPC chapters were represented in each sample. A majority of samples also met the remaining criteria. In a multiple regression analysis, with GPs' characteristics as independent variables and performance scores as dependent variables, only the characteristic "sole practice" appeared to be a significant (negative) factor of influence on communication scores ($p<0.05$). GPs' characteristics had no predictive value for scores on medical performance ($p<0.05$).

Multiple regression analysis indicated a significant association between the total duration of the 16 consultations of each sample (Mean 156.62, SD 19.62, Minimum 100, Maximum 200 minutes) with GPs' scores, on both communication and medical performance ($p<0.001$). The longer the duration of 16 consultations, i.e. the sample, the higher the total score.

In the questionnaire, 29% of physicians reported they were influenced constantly by the video observation: 12% considered the effect positive (i.e. better consultations), while 17% believed the effect to be negative. Conversely, 42% of GPs thought they were not influenced at all while 29% considered that they were only influenced during the first cases. Since the first five cases have not been included in 95% of the samples, one may conclude that the majority of GPs felt they were not

influenced by the observation. Moreover, 92% of the GPs recognized their usual style of performance, when they viewed the consultations after the analysis.

Reliability

The range in scores and the standard deviation in Table 3 indicate a broad distribution of scores, on both communication and medical performance.

TABLE 3. MAAS-GLOBAL SCORES OF GPs (N=93) IN PERCENTAGES: MEAN, STANDARD DEVIATION (SD) AND RANGE

	mean (SD)	range
communication	41.7 (7.4)	25.8-63.9
medical performance	62.0 (6.9)	47.1-84.1
overall performance	51.9 (6.6)	36.5-73.3

Table 4 shows generalizability coefficients as a function of the number of cases, the corresponding estimated testing time, and number of raters. Each entry represents a reliability estimate for the given sample sizes of cases and raters. An arbitrary "benchmark" of 0.80 is usually considered as a minimal acceptable value. This means that when an infinite number of similar tests is applied randomly to the same GPs with different cases in each test and different raters for each case, the average correlation expected between the scores of these tests would be >0.80. Using 2 raters, this value is found after 8 cases (i.e. 96 minutes) on the overall score, and on both communication and medical performance after 12 cases (i.e. 144 minutes). For one rater this level was reached after 12 and 16 cases respectively.

TABLE 4. RELIABILITY: GENERALIZABILITY COEFFICIENTS AS A FUNCTION OF THE NUMBER OF CASES AND RATERS

sample size		performance					
		overall		communication		medical	
cases	minutes	1 rater	2 raters	1 rater	2 raters	1 rater	2 raters
4	48	0.58	0.68	0.55	0.65	0.52	0.63
8	96	0.74	0.81	0.71	0.79	0.68	0.78
12	144	0.81	0.87	0.79	0.85	0.76	0.84
16*	192	0.85	0.90	0.83	0.88	0.81	0.87
20	240	0.87	0.91	0.86	0.90	0.84	0.90

*actual sample size used

Feasibility

In 3% of the installations, the video equipment had to be re-installed due to an erroneous operation by GPs; a further 5% of selected consultations had to be replaced by "spare" consultations on account of inadequate sound or vision quality. Thus 92% of consultations were recorded adequately in first instance, in both consulting rooms and examination rooms. Questionnaire data (response level 91%) showed that 82% of GPs considered the informed consent procedure clear; 85% of patients gave their permission to record. A minority of GPs (10%) considered video recording a burden for patients. Completion of the logbook took 92% of GPs less than 1 minute per case. Selection of consultations from the logbook by the researcher took 1 hour per participant. Peer-observers compared the logbook data with the content of video recordings and in 5% of cases logbook data appeared to be incomplete.

Table 5 provides an estimate of costs for two different sample sizes of consultations. One video set (£ 800, to be depreciated within 4 years) was used by 14 GPs, which reduced costs to £ 15 per GP. Peer-observers were paid £ 15 per hour and the electrician was paid £ 10 per hour.

TABLE 5. COSTS IN POUNDS STERLING (£) PER GENERAL PRACTITIONER (1 CASE = 12 MINUTES)

	12 cases	16 cases
equipment	15*	15*
videotapes	15*	15*
installation	50*	50*
one observer	75	100
administration	45	60
review logbook	20	25
raters training	30*	30*
total	£250	£295

* stable costs

Discussion

To our knowledge this is the first study which systematically addresses issues of validity, reliability, and feasibility of a video procedure for assessing both communicative and medical performance of general practitioners (GPs) in daily practice. A blueprint including a procedure for sampling of consultations by using selection criteria has been developed. Generalizability, i.e. reliability considering number of cases and observers, and aspects of feasibility, especially costs, were taken into account. In this way, a valid and reliable assessment procedure has been established. Results on acceptance should be interpreted with care since our study population participated voluntarily and the assessment was educative, not summative.

Concerning validity, the results show clearly that the domain of general practice was covered extensively by the procedures followed and a satisfactory content validity was obtained. Eight different ICPC chapters were represented in each sample. Concerning this classification system, it is estimated that the use of other classification systems will lead to the same conclusions. In addition, sufficient initial and follow-up consultations with both elderly patients and children were included, which support the representativeness of daily practice care. Our sample criteria, formulated for the selection of 16 cases, were well met. The lack of control over the case selection process, one of the major disadvantages of an observation in practice,²⁶ was prevented by this procedure. Strict sample uniformity does not seem desirable anyway, since a sample has to be representative for an individual GP. It should reflect differences between GPs as regards characteristics of their patient population, workload, working style and their perception of tasks.^{27,28} The variation in total duration of consultations of each sample may reflect these differences. The positive relationship between the total duration of the samples and GPs' scores on communicative and medical performance is in line with previous research.^{29,30} The negative relation between working single handed and high score of communication with patients may be explained by the contrasting difference with more partner practices, where collaboration must rely on communication and delegation of tasks within a team. Compared with selection of cases by candidates, case selection from the logbook by an external reviewer using preset criteria, prevents sampling bias. The logistics of producing 90 consultations should not be underestimated. However, provided that the video-equipment has been installed and the informed consent procedure has been handled at the desk, GPs spend on average one minute per case to fill in the logbook and patient care can be continued normally. Moreover, continuous videotaping regular consultations during several days increases the chance to observe what a doctor is doing in his day-to-day practice; this might be different from what a doctor is capable of doing.³¹

Finally, as regards validity, with two cameras actual performance was followed as closely as possible. Physical examination and concurrent communication are essential aspects of performance. Therefore, validity of video assessment in daily practice increases if equipment is able to record consultations in both consulting and examination rooms. Switching cameras by the GP intrudes on normal surgery routine, on the other hand, having others to operate equipment may entail high costs.³² An automatic switching system could solve this problem, which may decrease the audience effect.

We may conclude that the validity of this video assessment of GPs in daily practice is high.

The reliability results are encouraging, particularly considering the limitations in standardization of practice assessment. This is actually comparable or even better to test conditions using highly trained standardized patients in multiple station examinations at a "skills laboratory".^{33,34,35} These results may be explained by a consistency of GPs' usual performance during video recording, confirmed by GPs recognizing their usual working style in the consultations. In addition, peer-observers were trained in four sessions in scoring videotaped regular consultations with the explicit criteria. Adding another observer to each case substantially improves reliability, suggesting

considerable "rater bias". Therefore, efforts to improve reliability should be focused on rater training in scoring complex daily cases and on further development of nationally accepted guidelines for both communication and medical performance.³⁶

Finally, reliability (and validity) of this video assessment procedure could be enhanced by combining video observations with an inspection of medical records. However, clinical data are often incomplete and inconsistent, which may raise other problems.^{37,38,39}

Organization of our video assessment in daily practice proved to be feasible. Although 92% of all consultations were usable for data handling in first instance, this figure could even be higher with still better instructions to operators and GPs. Handling the informed consent procedure at the counter by the receptionists seems fair for the patients. Our figures of acceptability, similar to former studies,^{40,41} support this view, taking into account that physical examination was videotaped integrally. Our detailed informed consent procedure, the use of peer-observers and the transport of the tapes by registered mail or couriers may have decreased patients' and GPs' fear of abuse of tapes. For ethical reasons, in video assessment one should always demand from both GP-participants and peer-observers to handle the tapes as "medical secret" and to erase the video registrations after reviewing, as we did. No copies should be made. Concerning ethical aspects, these videotapes should be considered as a part of patients' medical files just like medical journals.

Concerning costs, compared with investments of resources in observation methods in medical education,⁴² the costs were acceptable, and could even be reduced by frequent use of the same video equipment and by integrating rater-training in regular quality improvement activities or in GP-trainer activities. Acceptance of both participant GPs and peer-observers was high due to the educative impact of a video assessment method, but participation was voluntary.

We conclude that we have developed a procedure for educative assessment of GPs by means of video observation in daily practice, taking into account issues of validity, reliability, feasibility and acceptability, which enables GPs to evaluate and to improve professional quality. There is a trade off between content validity and feasibility. Further research to increase feasibility and acceptability by reducing the number of consultations to be observed, while maintaining content validity and reliability, is needed. A decision about pass-fail level should be made if our procedure is used in selective assessment. Especially in high stakes assessments, credibility of the method is of major importance. In our opinion credibility and acceptability increases if the assessment method measures what it is supposed to measure in a reliable way.

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Chapter 3.

Assessment of practising family physicians: comparison of observation in a station examination using standardized patients with observation of real surgery in daily practice.

Summary

Purpose. To compare the measurement characteristics of a Multiple Station Examination in a skills laboratory, using standardized patients, with video assessment of regular consultations in daily practice in order to make an informed choice for a valid, reliable and feasible method to collect data on the performance of practicing family physicians on sound methodological criteria.

Methods. In a cross-sectional study, consultations of 90 family physicians were video taped both in a Multiple Station Examination at the medical school using standardized patients and their daily practice surgery with regular patients. Peer-observers assessed communication with patients and medical performance with a validated instrument (MAAS-Global). Participants were randomly divided into two groups, comparable for demographic characteristics, in order to check for time-order effects. Both groups passed through both assessments, but in reverse order. Content validity, criterion validity, reliability, i.e. generalizability, and feasibility of both methods were compared. Time-order effects were taken into account.

Results. Content validity of Practice Video Assessment was superior to the Multiple Station Examination, since the domain of general family practice care was better covered. Participants judged the video taped practice consultations as "natural", whereas hardly any family physician recognized his usual working style in the Multiple Station Examination, after reviewing the video taped consultations. Using specific criteria it proved to be possible to standardize real practice. Concerning concurrent validity, only the medical performance component of both methods correlated. Also real practice performance proved to be less influenced, thus more stable, than behavior during the station examination.

Reliability of both methods, expected to be better in the controlled Multiple Station Examination, was comparable. The organization of Practice Video Assessment was more flexible, less costly and better accepted by family physicians than the Multiple Station Examination.

Conclusion. Assessment for quality improvement of family physicians by video observation in daily practice is superior to video assessment in a simulated setting using standardized patients.

Keywords: family physician, general family practice, quality assessment, competence, performance, multiple station examination, direct observation, video.

Introduction

Improving quality of care of medical professionals, such as family physicians, demands regular collection and evaluation of data on competence and actual performance in practice. Such assessments should address whether care given to patients meets quality criteria in order to tailor educational activities to family physicians' real needs and deficiencies.^{1,2} Since it has been shown that self-ratings of performance usually produce overestimation of service delivery, and that self-selected postgraduate education has little effect on changing practice behavior of doctors, objective assess-

ment is preferred.^{3,4} Competence, defined as what a doctor is capable of doing, and performance, defined as what a doctor does in his day-to-day practice, should be assessed by valid, reliable and feasible methods.⁵ In addition, assessment should approximate the real professional practice as closely as possible, while maintaining standardized test-taking conditions.⁶ Assessment of doctors' performance by direct observation in the surgery is assumed to have a high validity.^{7,8} However, even modest levels of standardization of this "in vivo" assessment are difficult to acquire.⁹ The selection of consultations for assessment will be restrained by logistics of the organization, patients may not consent and family physicians may be influenced by the observation. This may decrease the representativeness of the sample and hamper generalizations.¹⁰ An alternative is "in vitro" assessment in a fully standardized lab using standardized patients (SPs). Well-developed methodologies of assessment using direct observation in a simulated situation have been proposed in recent decades, including the Objective Structured Clinical Examination (OSCE) and the Standardized Patient(SP)-based test.^{11,12} These methods involve simulation of clinical situations in so-called stations. The OSCE usually focuses on parts of an encounter, whereas an SP-based test typically uses standardized patients to simulate an encounter, each station focusing on an integrated approach of different reasons for encounter.¹³ These "multiple station examinations" offer the advantage of standardization by using uniform and standardized cases which can be directly observed and rated with objective checklists and rating scales. The question whether such a method relates to actual performance has resulted in conflicting evidence.^{14,15}

Performance assessment so far commonly relies on indirect measurements such as chart audits, chart review, assessment of referral letters or prescription data.^{10,16,17} These indirect methods too show limitations in predicting the quality of family physicians' actual performance.^{18,19} In order to further investigate the strengths and weaknesses of competence and performance assessment, in this study "in vitro" video-observation of family physicians in a station examination using standardized patients is compared with video-observation of their regular consultations in daily practice. This experimental study focuses on validity, reliability, and feasibility in order to select the most efficient method to be used in quality assessment of family physicians.

Methods

Subjects

All family physicians in the south of the Netherlands were invited by letter to participate in this study, of whom 220 (25%) reacted positively. For budgetary reasons 135 family physicians were randomly selected, 100 of them to be observed, 35 to serve as peer-observers. Personal and professional characteristics of the participants were collected and compared to the national population of family physicians to determine representativeness (T-test and Chi-Square test).

FIGURE 1. DESIGN

*period between both test-settings: $\pm$ 4 months

Procedure and Instruments

To check for any time-order effect, participants (N=100) were randomly divided into two groups of 50 each, comparable on personal and professional characteristics. Both groups went through two test settings, a Multiple Station Examination (MSE) and a Practice Video Assessment (PVA), but in a reverse order (Figure 1). In order to make the MSE and the PVA comparable, it was necessary to design the MSE as similar to real practice as possible and to standardize the PVA.

Eight standardized cases, to be used in the Multiple Station Examination, were written by a panel of seven family physicians. A blueprint was developed, reflecting complaints with high prevalence in general practice.^{20,21} The content of the cases was based on this blueprint. Cases represented both acute and chronic diseases as well as multiple problems within the same case (Figure 2). Checklists were derived from national guidelines for appropriate clinical performance.²² Rooms were equipped as real surgeries and participants were allowed to bring in their doctor's bag. Doctors remained in their rooms while eight well-trained standardized patients rotated from one doctor to another, schematically following a "time pressure design" of 12 minutes per doctor (96 minutes in total). Participants were instructed to perform as naturally as possible. All encounters were video taped.

FIGURE 2. CHARACTERISTICS SP-BASED MSE-CASES

	ICPC
1. Aspecific stomach pain	D
2. Headache by refractive disease (presbyopia)	F
3. Angina pectoris and peripheral vascular disease	K
4. Shoulder complaints (painfull arc) by surmenage	L
5. Disturbances of sleep and fatigue	P+B
6. Sore throat + partial deafness (eustacian salpingitis)	R+H
7. Exercised induced asthma	R
8. Check-up non-insulin dependent diabetes mellitus	T

For the Practice Video Assessment, during one week the participants' regular practice-site surgery consultations were video taped. Since a Practice Video Assessment is less standardized by nature than a Multiple Station Examination, more cases (16) were considered to be necessary for analysis. The cases were selected from a logbook completed by the participants on each patient seen.

Selection of these 16 cases was done by following a blueprint similar to the MSE, based on prevalence of diseases in general practice and on the national family physician task descriptions.^{20,21,23} On basis of this blueprint 10 sample criteria were formulated for the final selection of consultations. This process is described elsewhere.²⁴

For both MSE and PVA all consultations were assessed by peer observers, trained in four sessions, on quality of communication and medical performance using the MAAS-Global (Maastricht Anamnestic and Advice Scoring list-Global).²⁵ This validated rating scale contains 12 items on communication and 4 items on medical performance. Items are case-independent, to be scored on a 7-point Likert scale and anchored on an extensive list of detailed criteria.²⁶ To avoid a "halo effect",⁸ one observer scored only four MSE and six PVA consultations of the same doctor. In order to study generalizability for reliability analysis, 25% of all cases were observed by 2 observers independently.

Content validity, based on the blueprints described above, was assessed on the following aspects (see table 1): time-order effects (MSE and PVA), representativeness of the selected practice cases and influence of differences of sample characteristics on the practice performance scores, such as number and content of complaints, age and gender of patients, duration and type of consultations, i.e. follow-up or initial consultation (PVA). Furthermore, authenticity of MSE cases, influence of observation on the performance of the participants (the audience effect) and recognition of usual working style by the participants (MSE and PVA) were assessed by a questionnaire (13 items, 5-point Likert scale). Criterion validity was defined as the predictive value of the Multiple Station Examination for the Practice Video Assessment. Reliability was operationalized as generalizability. Acceptance of both procedures by family physicians was assessed with a questionnaire "feasibility and preference", with 15 items concerning the impact of the assessment procedures on practice

organization (5-point Likert scale) and one question about family physicians' preference to methods, on both communication and medical performance.

Analysis

Overall case scores were calculated by summing the scores on each item for each case. These were expressed as a percentage score (maximum 100%). The test score was the mean score across cases. These scores were also calculated for communication and medical performance separately.

TABLE 1. METHODS USED TO COMPARE THE PSYCHOMETRIC CHARACTERISTICS OF MULTIPLE STATION EXAMINATION (MSE) AND PRACTICE VIDEO ASSESSMENT (PVA)

Characteristics	MSE	PVA
Validity:		
Content validity:		
Content of cases selected	selection criteria:prevalence/guidelines	selection criteria:prevalence/guidelines
Time/order effect	t-Test	t-Test
Representativeness cases	by definition	statistics: % samples criterion fully met
Influence sample differences on scores	n.a.* (equal samples)	regression analysis
Authenticity cases	questionnaire	n.a.* (implicit)
Audience effect	questionnaire	questionnaire
Recognition of working style	questionnaire	questionnaire
Criterion validity	Pearson correlations	Pearson correlations
Reliability	generalizability analysis	generalizability analysis
Feasibility:		
Acceptance	questionnaire	questionnaire
Cost	keeping accounts	keeping accounts

*n.a. = not applicable

To study validity (table 1), time-order effects of the design were analyzed by calculating the significance of differences between the Multiple Station Examination scores and the Practice Video Assessment scores, within and between both groups (paired and unpaired t-Tests). Representativeness of selected cases in the PVA was assessed by calculating the percentages of samples which met the predetermined criteria. Influence of differences in PVA sample characteristics on performance scores was analyzed by a multiple regression analysis with the practice scores as dependent and the sample characteristics as independent variables. Authenticity of MSE cases was assessed by calculating the percentages of family physicians agreeing. The "audience effect" and recognition of usual working style in both methods were assessed by calculating the percentage of family physicians agreeing. Finally, concurrent validity between MSE and PVA (on communication and medical performance) was analyzed by calculating the observed correlations (Pearson), which were corrected for attenuation, i.e. for unreliability of the instruments.

Generalizability theory was used to estimate reliability, calculated on the data set which had multiple ratings per consultation.^{27,28} In the MSE different observers (raters) were used for each

case, and each case was similar for each doctor; therefore a "raters-nested-within-cases-crossed-with-persons" ANOVA was used. In the PVA different raters were used for each case and since each case, being a regular consultation, was different for each doctor, a "raters-nested-within-cases-within-persons" ANOVA was used. These designs allow for concurrent estimation of reliability of raters and cases and allow for estimated projections of reliability from the actual number of cases and raters used in the study to other hypothetical test conditions with different sample sizes.

To judge feasibility descriptive statistics of the questionnaire "feasibility and preference" were calculated. Cost of both tests was registered by keeping accounts.

Results

In total ten participants (10%) dropped out arguing that "participation is too threatening" (1%), "on holiday" (4%) and "too busy to participate" (5%). On demographic variables the study population (N=90) was representative for Dutch family physicians, except for age (Dutch family physicians: Mean 44.3 years, SD 5.5 against Mean: 43.1, SD 7.4. Unpaired T-test: $t=2.03$; $df=89$; $p<0.05$).

Validity

Scores on communication, medical performance and overall scores on the Multiple Station Examination (MSE) and Practice Video Assessment (PVA) are reported in table 2.

TABLE 2. MAAS-GLOBAL SCORES OF GPs (N=90) IN PERCENTAGES: MEAN AND STANDARD DEVIATION (SD)

	group 1 (N=46)		group 2 (N=44)	
	MSE mean (SD)	PVA mean (SD)	MSE mean (SD)	PVA mean (SD)
communication	44.4 (10.3)	41.3 (7.7)	52.4 (8.6)	42.1 (7.1)
medical performance	64.9 (8.5)	62.8 (7.6)	70.7 (6.4)	61.3 (6.2)
overall score	54.7 (8.4)	52.1 (7.1)	62.0 (6.6)	51.7 (6.1)

As regards time-order effects, within group 1 no significant differences were found between MSE and PVA scores. Within group 2 scores between MSE and PVA differed significantly, on both communication and medical performance ($p<0.001$). Comparing MSE scores of both groups, group 2 scored significantly higher than group 1 on both communication and medical performance ($p<0.001$). No significant difference was found between both groups for the PVA scores. Apparently scores on the Multiple Station Examination increased significantly when the Practice Video Assessment had been done previously (group 2), whereas PVA scores appeared to be consistent, irrespective of whether MSE had been done before or not (see figure 1).

In both groups, the scores on communication were significantly lower than the scores on medical

performance, in both MSE and PVA (all comparisons $p < 0.001$).

The eight MSE cases were judged as authentic by 94%, not authentic by 3% and neutral by 3% of the participants. In PVA the domain of general practice care was covered extensively since at least eight different ICPC chapters (criterion 1) were represented in every sample of all participants and other criteria such as heterogeneity in age and gender of patients were met in the majority ($> 70\%$) of all samples.²⁴ The sample characteristic "total duration of 16 consultations" (Mean: 156.62, SD: 19.62 minutes) showed a significant relationship with PVA scores: the longer the duration, the higher the performance, on both communication ($\beta = 0.351$; $p < 0.001$) and medical performance ($\beta = 0.356$; $p < 0.001$).

Table 3 reports data of the influence of observation on perceived performance and on recognition of usual working style, judged by participants after viewing the video tapes. Comparing both tests, significantly more family physicians judged they were influenced by observation in the MSE, in both groups 1 and 2. This difference was significantly higher in group 1 (MSE first, PVA later) than in group 2 (40% and 28% respectively; $p < 0.001$).

TABLE 3. RECOGNITION OF WORKING STYLE FOR COMMUNICATION AND MEDICAL PERFORMANCE AND INFLUENCE OF OBSERVATION ON PERFORMANCE, EXPRESSED AS THE PERCENTAGE OF GPs AGREEING

	group 1		group 2	
	MSE	PVA	MSE	PVA
recognition communication	6.3	93.7	16.7	83.3
recognition medical performance	6.3	93.7	12.2	87.8
permanent influence	75.0	35.5	50.0	22.0
no permanent influence	25.0	64.5	50.0	78.0

In table 4, observed and true Pearson correlations between the MSE and PVA scores are given, on communication, on medical performance and on overall scores separately for group 1 and 2. On medical performance a significant correlation between the scores of the MSE and PVA was found in both groups. No significant correlation was found between the scores of both tests on communication, either in group 1 or in group 2.

TABLE 4. OBSERVED AND DISATTENUATED CORRELATIONS BETWEEN MSE AND PVA

	group 1		group 2	
	observed	disattenuated	observed	disattenuated
	Pearson (p)	Pearson (p)	Pearson (p)	Pearson (p)
communication	.14 ¹	.17 ¹	.20 ¹	.25 ¹
medical performance	.41 (<0.01)	.59 (<0.01)	.23 ¹	.33 (<0.05)

¹ not significant*Reliability*

In table 5, generalizability coefficients are reported as a function of the number of cases, their corresponding estimated testing time, and number of raters, i.e. peer-observers, for both the Multiple Station Examination and the Practice Video Assessment. Each entry represents a reliability estimate for the given sample size of cases and raters. For example, using two raters a value of 0.81 (PVA) and 0.84 (MSE) on the total score was found for 8 cases, i.e. 96 minutes of testing time. An arbitrary "benchmark" of 0.80 is usually considered as an acceptable value, which is reached for all scores within two and a half hours of testing time, using two raters.

TABLE 5. RELIABILITY: GENERALIZABILITY COEFFICIENTS AS A FUNCTION OF THE NUMBER OF CASES AND RATERS

cases	time min.	Overall				Communication				Medical performance			
		MSE		PVA		MSE		PVA		MSE		PVA	
		raters		raters		raters		raters		raters		raters	
		1	2	1	2	1	2	1	2	1	2	1	2
4	48	0.57	0.72	0.58	0.68	0.60	0.75	0.55	0.65	0.42	0.59	0.52	0.63
8	96	0.72	0.84	0.74	0.81	0.75	0.86	0.71	0.79	0.59	0.74	0.68	0.78
12	144	0.80	0.89	0.81	0.87	0.82	0.90	0.79	0.85	0.68	0.81	0.76	0.84
16	192	0.84	0.91	0.85	0.90	0.86	0.92	0.83	0.88	0.74	0.85	0.81	0.87
20	240	0.87	0.93	0.87	0.91	0.88	0.94	0.86	0.90	0.78	0.88	0.84	0.90

*bold italics=real sample-sizes**Feasibility*

Fixed and variable costs were estimated for two different sample sizes of consultations of both methods. For a 12-case sample the cost for the MSE was \$530 and for the PVA \$375 and for 16 cases \$680 and \$440 respectively (see Table 6).

Participants' preferences to methods favored the PVA to MSE, on both communication (73% versus 27%) and medical performance (66% versus 34%).

TABLE 6. COSTS (\$) IN BOTH SETTINGS PER GP WITH 1 RATER (N=90)

	12 cases		16 cases	
	MSE	PVA	MSE	PVA
Administration	60	54	75	67
Equipment/rooms	52	22	70	22
Videotapes	7	22	7	22
Rater training	45	45	45	45
Observation	112	112	150	150
Feedback	15	15	22	22
Standardised patients	75	-	100	-
Script cases	7	-	10	-
Travelling costs (GP/SP)	45	-	51	-
Locum tenens costs	112	-	150	-
Installation video	-	75	-	75
Review logbook	-	30	-	37
Total	530	375	680	440
<i>stable costs</i>				

Discussion

In this study a Multiple Station Examination (MSE) at the medical school, using standardized patients, was compared with a Practice Video Assessment (PVA) in family physicians' practice, using regular consultations, on aspects of validity, reliability and feasibility. Results showed superiority of the Practice Video Assessment on all aspects. We realize that our study population is not representative, since the family physicians participated voluntarily, showing their readiness to be assessed. However, since our study is a methodological study and the psychometric characteristics of both methods were studied within the same study population, we think this non-representativeness is not a major bias.

Since scores of group 2 in the MSE (administered after PVA) were significantly higher than MSE scores of group 1 and no significant difference between both PVAs was found, one may conclude that a time-order effect only shows in one direction: from actual performance assessment to "in vitro" assessment, resulting in better scores for competence. Apparently, only "in vitro" assessment is influenced by previous assessment experiences. This stability in scores in the Practice Video Assessment may be explained by the entity of common interaction between family physicians and their patients in daily practice.

In both settings satisfactory content validity was achieved: authenticity of standardized station cases was confirmed by family physicians and in the Practice Video Assessment the domain of general

practice care was well covered as was evident from the attained sample criteria. However, PVA consultations were more authentic than MSE cases since initial and follow-up consultations with children and older patients in the natural daily context were included.²⁴ Moreover, almost all family physicians judged the video taped practice consultations as "natural", whereas hardly any family physician recognized his or her working style in the standardized station cases, since they met unknown standardized patients in an artificial setting. The influence of variation in total duration of the 16 PVA consultations on performance scores reflects differences between family physicians in their perception of tasks, work load and working style. Therefore, our selection criterion (≥ 5 and ≤ 15 minutes/consultation) contributes to the representativeness of the samples. Finally, concurrent validity between MSE and PVA is ambiguous, since only a moderate correlation was found for medical performance. Overall, validity of the PVA is superior to MSE.

Reliability results of both methods are encouraging, compared with other studies.^{29,30,31} We expected results to be superior for the controlled Multiple Station Examination, but after 16 cases a "benchmark" of 0.80 was met for all scores, except for medical performance in the MSE. This finding favors the Practice Video Assessment. Family physicians may perform more consistently in their authentic daily practice, whereas they show more variability from case to case in an unfamiliar competence test. Adding another rater to each case substantially improves the reliability in both test formats, suggesting considerable rater bias. Therefore, efforts to improve reliability should be focused on rater training. Overall, the expected loss of reliability of the PVA as compared to MSE was not confirmed.

Finally, the Multiple Station Examination is more expensive than the Practice Video Assessment, through the use of standardized patients, laboratory facilities and travelling cost for participants and standardized patients. Furthermore, the MSE was more burdensome for participants because of travelling time, disruption of patient care by being out of their practice and the fixed period of organization. In contrast, in the PVA patient care was continued normally and the planning of the period of video recordings was more flexible without increasing cost. Again, the Practice Video Assessment appeared to be superior to the Multiple Station Examination.

We conclude that results on validity, reliability and feasibility favor the Practice Video Assessment over the Multiple Station Examination. In quality assessment of communication and medical performance of practicing family physicians, video observation in daily practice is therefore to be preferred to assessment by observation in a controlled simulated situation.

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Chapter 4.

Assessment in General Practice: the predictive value of Written Knowledge Tests and a Multiple Station Examination for actual medical performance in daily practice.

In press by Medical Education: Assessment in General Practice: the predictive value of Written Knowledge Tests and a Multiple Station Examination for actual medical performance in daily practice. Paul Ram, Cees van der Vleuten, Jan-Joost Rethans, Berna Schouten, Sjoerd Hobma & Richard Grol

Summary

This study compares the predictive values of written knowledge tests and a standardized Multiple Station Examination for actual medical performance of General Practitioners (GPs) in order to select effective assessment methods to be used in continuing medical education and quality improvement.

First, 100 GPs from the southern part of the Netherlands were assessed by a general medical knowledge test and by a knowledge test on technical skills. Second, in order to check for time-order effects, participants were randomly divided into two groups of 50 each, comparable on scores of both knowledge tests and on professional characteristics. Finally, both groups went through a Multiple Station Examination using standardized patients and a Practice Video Assessment of real surgery, but in opposite orders. All consultations were videotaped and assessed by well trained peer observers. Drop-out was 10%.

In both groups the predictive value of medical knowledge tests, ranging from 0.43-0.56 (Pearson correlation disattenuated), proved to be comparable with the predictive value of the Multiple Station Examination for actual performance (0.33-0.59). The overall explained variance of scores of the Practice Video Assessment, measured by multiple regression analysis with performance scores as dependent variables and scores on the knowledge tests and professional characteristics as independent variables was moderate (35%). A time-order effect showed in only one direction: from Practice Video Assessment to the Multiple Station Examination. GPs' professional characteristics did not contribute to the explanation of variation in performance scores.

Medical knowledge tests can predict actual clinical performance to the same extent as a Multiple Station Examination. Compared with a station examination, a knowledge test may be a good alternative method for assessment procedures of a large number of practising GPs.

Keywords

General practice, competence, performance, knowledge tests, multiple station examination, video observation, assessment, general practitioners.

Introduction

After completing a vocational training scheme, a general practitioner (GP) is supposed to have reached a level of competence which should reflect the demands of diagnostic, patient management and communication skills in daily practice. There is growing consensus that this level of competence does not imply the same level of actual performance in day-to-day practice during the rest of the GP's professional life.^{1,2} Performance may change due to several interrelated factors such as changes in medical knowledge, practice organization or age.³⁻⁶ To sustain an acceptable level of performance GPs should attend postgraduate courses. Although time investment for these courses

may be set, the choice of topics usually depends on the individual GP and his or her subjective needs. Subjective selection of topics in continuing medical education (CME) is hardly effective in changing the practice behaviour of doctors.⁷ If deficiencies in practice performance could be objectively identified, CME and quality improvement could be matched better to real needs in order to maximize effectiveness.⁸ Therefore, an assessment procedure is needed that is both valid and reliable in revealing deficiencies in performance of GPs and appropriate for use on a large scale. Knowledge tests such as Multiple Choice Questions (MCQs) are efficient in handling large numbers of GPs and can easily cover a wide content domain.⁹ On the other hand, critics raise doubts about the validity and acceptability of MCQs, claiming that selecting options from a list of alternatives is quite distant from clinical reality.^{10,11} Moreover, these methods mainly assess aspects of competence, i.e. what a doctor is capable of doing, and this may not be the same as what a doctor does do in his day-to-day practice (performance), the ultimate focus of quality improvement.¹² In this perspective the question arises whether results on written tests do predict actual performance in practice. Different studies have shown a moderate positive relationship between written tests and performance measurements.¹³⁻¹⁵ Performance in these studies was assessed either indirectly by chart review and chart stimulated recall, or directly by peer rating by colleagues who worked with the observed colleague. Assessment by using medical records has its limitations, since clinical data are often incomplete and inconsistent.¹⁶ Observation by cooperating colleagues may be quite subjective and is not useful in single-handed practices. Direct observation using trained (peer) observers, not cooperating with the observed physician, may be more valid and reliable. However, assessment in daily practice is difficult to standardize. Better controlled competence-based tests closely linked to professional reality, called Multiple Station Examination or Objective Structured Clinical Examination (OSCE), could be alternatives.^{17,18} In these methods clinical skills must be demonstrated in standardized simulated clinical situations using direct (video) observation to score performance. These tests have more authenticity than knowledge tests and include aspects of problem solving, patient management and attitude. Therefore, these are assumed to have better predictive value for actual performance than written tests. However, implementation on a large scale may be more difficult, because of the high resource requirements and its organizational complexity.¹⁹ Moreover, research on the predictive value of these methods has resulted in conflicting evidence.²⁰ In all, more insight is needed into the value of both knowledge testing and station examinations to predict performance in regular clinical practice.

The study presented here compares the predictive value of written knowledge tests (less valid, feasible) with the predictive value of direct observation in a Multiple Station Examination (more valid, less feasible) for medical performance in daily practice.

Methods

Subjects

All general practitioners in the south of the Netherlands were invited by letter to participate in this intensive study and 220 (25%) reacted positively. For budgetary reasons 135 were randomly selected, 100 to be assessed, 35 to participate as peer observers. Data on personal and professional characteristics (age, gender, working single-handed, being medical teacher, working full-time or part-time, urbanization area) were collected.

Instruments and procedure

Knowledge tests and observation instruments were screened on their psychometric qualities. Two instruments with established validity and reliability were included. These were a general medical knowledge test and a scoring list for direct observation of medical performance and communication with patients, the MAAS-Global.^{21,22} The general medical knowledge test consists of 60 short cases with 131 items about complaints and diseases, stratified according to chapters of International Classification of Primary Care (Cronbach's $\alpha = .64$).²³ Using the blueprint of the general medical knowledge test, a knowledge test on medical technical skills was constructed (124 items, Cronbach's $\alpha = .60$) in order to cover the broad cognitive domain of general practice as completely as possible.²⁴ This knowledge test on skills is focused on knowledge pertaining to why and how a certain skill should be performed, the skills being used in daily practice and selected from nationally accepted job description and guidelines for general practice.²⁵ Answers on both knowledge tests were given in a true/false/? format. Item-examples of both the general medical knowledge test and the knowledge test on technical skills are shown in figure 1 and 2 respectively.

FIGURE 1. EXAMPLE OF CASE WITH SUBSEQUENT QUESTIONS FROM THE GENERAL MEDICAL KNOWLEDGE TEST

Mrs. Cleveland, 75 years old, is known with an advanced arthrosis of her left knee. She enters the room, walking slowly and leaning to the right on her stick. The left knee is swollen and warm. There is a hydrops.

Among the therapeutical measures, adequate at this moment, is/are:

- application of icepacks	true/false/?
- massage and exercises	true/false/?
- intra-articular injection of corticosteroids	true/false/?
- holding the stick in the other hand (left)	true/false/?

Literature: Linden AJ van der, Claessens H. Leerboek orthopaedie, 1995.

FIGURE 2. EXAMPLE OF CASE WITH SUBSEQUENT QUESTION FROM THE KNOWLEDGE TEST ON TECHNICAL SKILLS

The GP decides to resuscitate an infant (less than 1 year old), who has no signs of spontaneous breathing nor arterial pulsations. The head of the infant is hyperextended.

- The correct extent of hyperextension of the head is LESS with an infant compared to an adult. true/false/?

The GP places his mouth over the nose and mouth of the infant.

- This is a correct procedure for insufflation of an infant. true/false/?

During the resuscitation the GP gives thorax compression at a rate of about 90 per minute.

- This is a correct rate for infants. true/false/?
- During resuscitation of an adult the adequate rate of compressions is closer to 80 per minute than to 60 per minute. true/false/?
- During resuscitation with one resuscitator the recommended schedule is: 15 compressions followed by 1 insufflation. true/false/?

Literature: Leerboek elementaire reanimatie. Den Haag: Nederlandse Hartstichting 1996

Participants were assessed in three sequential steps (see figure 3). First, the two knowledge tests, both paper-and-pencil tests, were sent to the participants. After the knowledge tests had been completed, a randomization was done in order to check for order effects caused by the design. Two groups of 50 GPs each, comparable on demographic characteristics and on scores of the knowledge tests, were formed. In steps two and three both groups were observed directly. Group 1 went first through a Multiple Station Examination, a real life-like surgery at a skills laboratory of the medical school, using eight stations with cases presented by standardized patients. All consultations were videotaped. A few months later these GPs went through the Practice Video Assessment of regular surgeries in daily practice. Group 2 started with the Practice Video Assessment and followed by the station examination some months later. In the Practice Video Assessment, medical performance including physical examination (and communication with patients) was recorded during one week with patient's consent using two cameras. By means of 10 preset criteria a representative sample of 16 consultations was selected from a logbook completed by the GPs.²⁷

In both tests medical performance was assessed by trained peer observers using the MAAS-Global scoring list.²⁶

Validity of both tests proved to be adequate in previous research.²⁷ Reliability, i.e. generalizability coefficients,²⁸ of the scores in the Multiple Station Examination was 0.59 (8 cases) and of the scores in the Practice Video Assessment 0.83 (16 cases).

FIGURE 3. STUDY-DESIGN

Analysis

Scores on knowledge tests were calculated as the sum of correct minus incorrect scores (correction for guessing). Case scores in the Multiple Station Examination and Practice Video Assessment were calculated by summing the number of item responses for each case. All scores were expressed as percentages of the maximum score. The test score was the mean score across cases. The predictive value of both written knowledge tests and the Multiple Station Examination for actual performance in the Practice Video Assessment was assessed by calculating the bivariate correlations (Pearson, observed and corrected for attenuation) between these methods. Confounding of the predictive values by GPs' characteristics and by a time-order effect was assessed by using a multiple regression analysis with Practice Video Assessment scores as dependent variables and scores on the knowledge tests, scores on the Multiple Station Examination, professional characteristics and possible time-order effects as independent variables. In this way the percentages of explained variance in the practice scores were calculated (R and R-squared). Time-order effects were assessed by calculating the significance level of differences between scores of the Multiple Station Examination and scores of the Practice Video Assessment, between and within both groups (paired and unpaired T-tests).

Results

Drop out

In total ten participants (10%) dropped out arguing that "video observation is too threatening" (1%), "on holiday" (4%) and "too busy to participate" (5%). The study population (N=90) was representative of Dutch GPs for professional and personal variables, except for age (Mean 43.1, SD 5.5; Dutch GPs Mean 44.3, SD 7.4. T-test: $t=2.03$; $df=89$; $p<0.05$).

Scores and differences in scores, within and between both groups

Table 1 shows descriptive statistics for scores of the knowledge tests and Multiple Station Examination on medical competence and for scores of Practice Video Assessment on medical performance, for groups 1 and 2. Scores of the general medical knowledge test were significantly higher than the scores of the knowledge test on technical skills ($t=21.5$; $df=89$; $p<0.01$; paired T-test). Time-order effects are revealed within group 2 where scores between the Multiple Station Examination and Practice Video Assessment differed significantly ($t=8.2$; $df=43$; $p<0.01$; paired T-test). In the Multiple Station Examination group 2 scored significantly higher than group 1 ($t=3.7$; $df=89$; $p<0.05$; unpaired T-test). No significant difference was found between groups for scores of the Practice Video Assessment ($p<0.05$). Apparently the scores of the Multiple Station Examination increased significantly when a Practice Video Assessment was done beforehand (group 2), whereas practice scores appeared to be unaffected by previous assessment experiences. This time-order effect was therefore taken into account as an independent variable in regression analysis.

TABLE 1. SCORES KNOWLEDGE TESTS, MULTIPLE STATION EXAMINATION AND PRACTICE VIDEO ASSESSMENT IN PERCENTAGES AND DIFFERENCES OF SCORES BETWEEN AND WITHIN BOTH GROUPS

	number of items	group 1 (n=46)		group 2 (n=44)	
		mean (SD)	range	mean (SD)	range
Knowledge tests:					
general medical	131	52.7 (11.5)	24.4 - 80.9	50.8 (11.0)	31.3 - 72.5
technical skills	124	31.1 (10.9)	6.5 - 54.0	31.4 (12.5)	6.5 - 54.8
Multiple Station Examination	8 cases	64.4 (8.6) ¹	49.1 - 83.0	70.1 (5.9) ^{1,2}	55.7 - 84.4
Practice Video Assessment	16 cases	62.8 (7.6)	47.1 - 84.1	61.3 (6.2) ²	47.6 - 75.8

¹ significant difference ($p<0.001$) between groups on same measure (Multiple Station Examination)

² significant difference ($p<0.001$) within group 2 between different measures (station-practice)

Predictive values

Table 2 shows the correlations (observed and disattenuated with their significance levels) of scores of knowledge tests and scores of the Multiple Station Examination with scores of the Practice Video Assessment. In both groups the two medical knowledge tests correlate significantly with medical performance in practice. These correlations are comparable with the correlation between scores of the Multiple Station Examination and scores of the Practice Video Assessment.

Table 3 shows the results of multiple regression analysis with Practice Video Assessment scores as dependent variables and the scores of both knowledge tests and Multiple Station Examination, time-order effect (group 2) and professional characteristics as independent variables. The multiple R and R-squared are given, representing percentages of variance explained by the variables in equation. Overall, the explained variance is moderate. The general medical knowledge test contributes to the explained variance more than the Multiple Station Examination does. Personal and professional characteristics of the GPs did not contribute to explained variance.

TABLE 2. OBSERVED AND DISATTENUATED PEARSON CORRELATIONS BETWEEN KNOWLEDGE TESTS AND PRACTICE VIDEO ASSESSMENT (PVA), AND BETWEEN MULTIPLE STATION EXAMINATION AND PRACTICE VIDEO ASSESSMENT

	PVA group 1 (n=46)		PVA group 2 (n=44)	
	observed	disattenuated	observed	disattenuated
Knowledge tests				
general medical	0.41 ¹	0.57 ¹	0.33 ²	0.46 ¹
technical skills	0.41 ¹	0.59 ¹	0.32 ²	0.46 ¹
Multiple Station Examination	0.41 ¹	0.59 ¹	0.23	0.33 ²

¹ p<0.01

² p<0.05

TABLE 3. MULTIPLE REGRESSION ANALYSES: PRACTICE VIDEO ASSESSMENT (PVA) SCORES AS DEPENDENT VARIABLES, RESPECTIVE TEST SCORES AND SCORES ON PROFESSIONAL CHARACTERISTICS AS INDEPENDENT VARIABLES

	Beta	t	R	R-squared (adjusted)
general medical knowledge test	0.26	2.61 ¹	0.37	0.13 (0.12)
station examination	0.33	3.10 ¹	0.43	0.19 (0.17)
time-order effect	-0.23	-2.19 ²	0.48	0.23 (0.20)

¹ p<0.01

² p<0.05

Discussion

The aim of this study was to compare the predictive value of knowledge tests with the predictive value of a Multiple Station Examination for actual medical performance, assessed by video observation in GPs' day-to-day practice. We realize that our study population is not representative, since GPs participated voluntarily. However, since our study is a methodological study this non-representativeness is not a major problem. In addition, the predictive values of the different instruments for actual performance were studied within the same study population.

Both the general medical knowledge test and the knowledge test on skills proved to predict actual medical performance to the same extent as the Multiple Station Examination. These findings contrast with the hypothesis that competence-based tests using direct observation, such as multiple station examinations and OSCEs, will have a stronger relationship with actual performance than knowledge tests. These findings may be explained by the reported "audience-effect", i.e. influence of observation on performance, in the Multiple Station Examination.²⁷ In a questionnaire, taken after the study, a majority of GPs reported they felt inhibited by the observation throughout the entire station examination, judged as an artificial and unfamiliar setting, whereas a minority said they were influenced in the Practice Video Assessment. As a consequence, a majority of GPs judged the videotaped consultations of daily surgery as "natural". In the videotaped consultations of daily surgeries they recognized their normal "working style" better than in the standardized station consultations. This audience effect may lead to special variation in GPs' performance in each case of the Multiple Station Examination, which may disturb the correlation with actual performance in daily practice. Compared to these effects in multiple station examinations, written tests and observation in daily practice may be less intrusive.

The knowledge tests were sent to the participants, which could be a scope for cheating. However, the assessment was purely educative and looking up things would minimize the educational value, as the participants was told. Moreover, cheating would have had a decreasing effect on the relationship between knowledge and performance. Cheating GPs probably would have a high knowledge test score and lower performance score, having less ready knowledge available.

At variance with knowledge tests, GPs' (professional) characteristics did not contribute to the explanation of variation in performance scores. This suggests that knowledge tests are much better predictors for strengths and weaknesses in actual performance for groups of GPs than GPs' characteristics such as age, gender, working single-handed or being a GP-trainer. Since well-developed knowledge tests are available for screening purposes, the current system of postgraduate medical education, allowing GPs to choose on subjective needs, is highly questionable and should become a serious matter of debate.

Finally, we conclude that medical knowledge tests should be developed for use in assessment of practising GPs. Compared with multiple station examinations and OSCEs, knowledge tests can be used on a broad scale with fewer logistical problems. In addition, these predict actual performance

relatively well. Nevertheless, the explained variance in actual performance by knowledge tests and station examination reported here, is too low to bridge the gap between competence and actual performance assessment. In assessment of practising GPs a combination of different methods, including observation in daily practice, is probably the most valid and reliable approach.

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Chapter 5

Structure and process: the relationship between practice management and actual clinical performance in general practice.

Summary

Objectives. The precise relationship between practice management (structure) and the doctor's actual performance (process) in general practice is tenuous. Analysis of their mutual relationship may yield insight into the way they contribute to outcome and into corresponding assessment procedures.

Method. In a cross sectional study consultations of 93 General Practitioners (GPs) were videotaped in their own practice and assessed by peer-observers on medical performance and on communication with patients, followed by a practice visit by a non-physician observer using a validated Visit Instrument to assess Practice management (VIP).

Pearson correlations (observed and disattenuated for unreliability of the instruments) between scores on 22 practice management dimensions and scores of 16 selected cases on medical performance and communication were calculated. The predictive value of specific practice management aspects for actual performance was determined by multiple regression analysis, with performance scores as dependent variables and scores on the 22 management dimensions and GPs' professional characteristics as independent variables.

Results. Nine practice management dimensions correlated significantly with medical performance and so did five dimensions with actual communication with patients. Overall, most associations were weak.

Combined with demographic variables (age for medical performance and working single-handedly for communication), 26 percent of variance in medical performance scores could be explained by only three practice management dimensions. The practice management dimension "delegation of medical technical tasks to the practice assistant" explained 11 percent of variance in communication with patients. Organization of quality assessment activities explained most of the variation in medical performance.

Conclusions. Practice management (structure) and actual performance (process) seem largely autonomous constructs. Quality improvement and assessment activities should emphasize that practice management is different from actual performance. Structure and process may contribute to patient outcome independently from each other.

Keywords: general practice, practice management, structure, clinical performance, process, assessment.

Introduction

Maintaining and improving quality in all aspects of patient care is of paramount importance and a challenge for all General Practitioners (GPs). It requires setting targets for good clinical practice and a continuous process of collection and evaluation of data on clinical performance, on communication with patients as well as on practice management.^{1,2} A framework for measuring quality is

available: the classic triad of structure, process and outcome.³ In this triad, structure describes the physical features of health care, emphasizing surgery premises, equipment, medical records and other aspects of practice management, whereas process refers to clinical interactions and communication between doctors and patients. The synonym for process is actual clinical performance, defined as what a doctor is doing in daily practice in medical care and in communication with patients.⁴ Outcome is defined as the changes in a patient's current and future health status that can be attributed to past health care and is the ultimate target of quality of care. The precise relation between structure and process is still tenuous.⁵ More structure tended to be equated simplistically with better care and poor management was supposed to result in a lower standard of clinical care.⁶ One has assumed that for the average doctor quality fails when the system or structure fails.⁷ This presumed self-evidence and lack of valid and reliable methods for assessment of actual clinical performance and of practice management may be responsible for the indistinctness of this relationship to the present day. Previous studies analysed clinical performance extensively, but usually in competence-based tests using standardized patients or in daily practice isolated from practice management.⁸⁻¹⁰ In conclusion, there is still no evidence that structure and process are two inter-related constructs, ending in patient outcome via an imaginary continuous line.¹¹

Insight in the precise relationship between structure and process will influence quality improvement activities of an individual GP, the profession and assessors in general practice. For example, improving performance (process) may depend on specific practice management aspects (structure) which are directly related to that specific performance, for example: "is my performance hampered because of the presence of an uncalibrated blood pressure device?" On the other hand, performance and practice management aspects can be analysed separately if there is no mutual relationship. In addition, guidelines and standards for clinical performance set by the profession should include indicators for specific practice management aspects if these are "conditional" for good performance.¹² Finally, the possible use of practice management aspects as "performance indicators" in assessment procedures, less complex and less expensive than direct assessment of performance, depends on the predictive value of those aspects for actual performance.¹³ Therefore, transparency in the relation between structure and process will benefit effectiveness, efficiency and other core components of quality.¹⁴

Recently, valid and reliable methods to assess practice management and actual performance have become available.¹⁵⁻¹⁷ The focus of this study was to investigate the relation between different aspects of practice management on the one hand with actual medical performance and actual communication with patients on the other. We especially focused on the predictive value of practice management for actual performance.

Method

Procedure and subjects

In a cross-sectional study actual performance and practice management of 93 GPs were assessed, by using videotaped regular consultations and by visiting GPs' practices. GPs in the south of the Netherlands were invited by letter to participate in this study and 220 (25%) reacted positively. For budgetary reasons 135 GPs were randomly selected for the study, 100 of them to be video taped and assessed in daily surgery and to be visited by trained non-physician observers, the other 35 to serve as peer observers to assess the video taped consultations.

Personal or professional characteristics such as age, gender, working full time or part time, working single-handedly, or having a training practice were taken into account since these characteristics may influence actual performance.¹⁸

Assessment of actual clinical performance (process).

A video-observation system, two cameras with built-in microphone, a monitor and a recorder, was installed by trained electricians in each practice. All consultations were recorded both in the consultation room and the examination room. The GP was responsible for switching from one camera to the other, and for recording patient and consultation data into a logbook directly after the consultation. The practice-assistant informed patients about the video recording and asked their permission. Consent was registered and video recordings were erased if patients revoked their permission. In order to select a representative sample of consultations, a "blueprint" for this video assessment of actual performance was designed based on the prevalence of complaints and diseases in general practice and on a nationally accepted job description.^{19,20} By means of this blueprint ten specific selection criteria were formulated. Using logbook data 20 consultations per GP, 16 for direct observation and 4 as reserve, were selected. After selection, the percentages of samples which met each criterion fully were calculated. In this way content validity of the sample of consultations was obtained (table 1). The consultations were assessed by peer observers using the MAAS-global scoring list. This is a validated instrument for measuring both communication with patients and medical performance. This instrument consists of 12 items on communication, such as exploring patients' reason for encounter, organizing the consultation systematically, summarizing, and reflecting emotions, and four items on medical performance: history-taking, physical examination, evaluation/diagnosis and patient management.^{21,22}

Reliability of the video assessment of actual performance was calculated using generalizability theory.²³ Acceptable generalizability coefficients (>0.80) were reached after 16 consultations for scores both on communication with patients and medical performance using a single rater.²⁴

Assessment of practice management (structure)

After video observation of actual clinical performance, practice management of participants was assessed by a trained non-physician observer using the "Visit Instrument to assess Practice management (VIP)" in a practice visit.²⁵ In this method, practice management is defined as "all aspects of

the GP's task necessary to realize good operation of care, excluding clinical care or treatment of patients", and it concerns premises and equipment, delegation to the assistants and collaboration with health professionals, service and organization of the practice, administration, organization of quality improvement, workload and job stress. This method is based on a framework comprising six chapters and twenty-two dimensions covering the complete domain of practice management, validated by means of consecutive studies in three groups with 59, 110 and 90 GPs respectively.¹⁶ The number of indicators for each dimension of practice management are represented in table 2. GPs, practice assistants, patients and observers completed questionnaires and observation sheets before and during the practice visit. The response category was "yes or no" for most indicators, except for time spent on collaboration, waiting time for patients and workload (minutes and hours) and for job stress (5-point Likert scale).

TABLE 1. SAMPLE CRITERIA FOR SELECTING VIDEO TAPED CONSULTATIONS TO BE INCLUDED IN DATA ANALYSIS AND PERCENTAGE OF SAMPLES WHICH MET THE CRITERION FULLY

sample criteria		samples (%) in which criterion was fully met
1.	representativeness of ≥ 8 different ICPC chapters	100.0
2.	the first 5 video taped consultations not included	94.6
3.	at least 8 cases with accepted guidelines	86.2
4.	representativeness of 5 ICPC chapters with highest prevalence: D, K, L, R and S	71.3
5.	at least 14 cases with duration ≥ 5 and ≤ 15 minutes / case	86.2
6.	age distribution: youngest patient < 18 years and oldest patient > 65 years	84.0
7.	gender heterogeneity: ≥ 6 and ≤ 10 female patients	72.3
8.	at least 8 initial consultations, at least 4 follow-up consultations	70.2
9.	maximum 2 cases with > 2 reasons for encounter	92.6
10.	maximum 2 cases with only psychosocial problems	93.6

TABLE 2. PRACTICE MANAGEMENT: SIX CHAPTERS AND 22 DIMENSIONS

	Indicators (n)
I. Equipment of the Practice	
1. Hygiene	8
2. Presence of equipment	14
3. Use of equipment	12
4. Content of the doctors bag	11
II. Delegation and Collaboration	
5. Delegation of clinical and technical tasks	9
6. Delegated laboratory tests (in service)	4
7. Collaboration with colleagues (local GP-group)	12
8. Collaboration with direct staff (primary level)	5
9. Collaboration with other careproviders	8
III. Service and Organization	
10. Accessibility	6
11. Organization of surgery/availability	5
12. GP's usage of information materials (in surgery)	3
13. Organization of information	7
14. Organization of preventive activities	9
IV. Medical Record Keeping	
15. Summary health problem/background	5
16. Recording using SOAP system	4
17. Recording of prescription	4
18. Level of computerized records	4
19. Actual usage of records	3
V. Organization of Quality Improvement	
20. Quality assessment activities (year report, assessment on outcome data)	6
VI. Workload and Job Stress	
21. a. Primary activities (direct patient care)	4
b. Secondary activities (indirect patient care)	7
c. Tertiary activities (medical education)	3
d. Quarternary activities (professional meetings)	1
e. Total workload	15
22. a. Job satisfaction, commitment	4
b. Inappropriate demands	4
c. Satisfied with available time	5
d. Costs versus benefits	3
e. Experienced workload	16

Analysis

For the Practice Video Assessment consultation scores were calculated by summing the item responses on the MAAS-Global for each consultation expressed as a percentage score. The mean score across the 16 consultations (i.e. the sample) determined the total score of the participant. These scores were calculated for the communication with patients and medical performance separately. Similarly summing the item responses of indicators resulted in scores on each practice management dimension of the VIP.

Pearson correlations, observed and disattenuated for unreliability of the instruments, between scores on the 22 dimensions of practice management and the MAAS-Global scores on both medical performance and communication with patients were calculated. To determine predictive value of practice management aspects for actual clinical performance a multiple regression analysis was used with both medical performance scores and communication scores as dependent variables and scores on the 22 practice management dimensions and the GP's (professional) characteristics as independent variables. R-squared was calculated to measure the extent of explained variance in the performance scores.

Results

In total seven participants (7%) dropped out arguing that "participation is too threatening" (1%), "on holiday" (2%) and "too busy to participate" (4%), leaving 93 GPs for whom complete data could be collected. On demographic variables the study population (N=93) was representative for Dutch GPs, except for age (Dutch GPs' Mean: 44.3 years, SD: 5.5 against Mean: 43.1 years, SD 7.4. T-test: $t=2.03$; $df=92$; $p<0.05$).

Table 3 shows disattenuated Pearson correlations between practice management dimensions of the VIP on the one hand and scores on medical performance and communication with patients of the Practice Video Assessment on the other.

TABLE 3. PEARSON CORRELATIONS BETWEEN SCORES ON PRACTICE VIDEO ASSESSMENT (PVA) AND SCORES ON PRACTICE MANAGEMENT DIMENSIONS OF THE VIP

Dimension	PVA medical performance		PVA communication	
	true correlation (p)		true correlation (p)	
I. Equipment of Practice:				
1. Hygiene	.30	(.01)	.31	(.01)
2. Presence equipment	.32	(.01)	.21	(.05)
3. Use equipment	.28	(.01)	.03	*
4. Doctor's bag	.10	*	.03	*
II. Delegation and Collaboration:				
5. Delegation tasks	.08	*	.20	(.05)
6. Delegated tests	.26	(.05)	.35	(.01)
7. Collaboration colleagues	.12	*	-.06	*
8. Collaboration direct staff	.04	*	-.00	*
9. Collaboration others	-.13	*	-.10	*
III. Service and Organization:				
10. Accessibility	-.09	*	-.20	*
11. Surgery/availability	.01	*	.16	*
12. Usage information	.06	*	-.15	*
13. Organization information	.11	*	.11	*
14. Organization prevention	.09	*	.04	*
IV. Medical Record Keeping:				
15. Summary basic data	.22	(.05)	.34	(.01)
16. SOAP system	.23	(.05)	.01	*
17. Prescription	.24	(.05)	.04	*
18. Computerized records	.16	*	-.09	*
19. Usage records	.14	*	.09	*
V. Org. Quality Improvement:				
20. Quality activities	.43	(.01)	.32	(.01)
VI. Workload and Job Stress				
21a Primary activities	-.07	*	-.14	*
21b Secondary activities	-.07	*	-.09	*
21c Tertiary activities	.22	(.04)	.10	*
21d Quarternary activities	.19	*	.00	*
21e Total activities	.07	*	-.12	*
22a Job satisfaction	.07	*	-.02	*
22b Inappropriate demands	.07	*	.07	*
22c Satisfied available time	.14	*	.12	*
22d Costs versus benefits	.13	*	-.15	*
22e Experienced workload	.02	*	-.02	*

* = not significant

observed correlations

For dimension 21 (workload in hours/week) only, the observed correlations are represented, since no reliability, i.e. internal consistency, could be measured on this dimension.

Nine practice management dimensions correlated significantly with medical performance: "Hygiene", "Presence of equipment", "Use of equipment", and "Laboratory tasks delegated to the practice assistant"; three dimensions for medical record keeping: "Recording basic data/problem lists", "Recording using SOAP system" and "Recording of prescriptions"; in addition, "Organization of quality improvement" and "Tertiary activities" (i.e. workload in hours per week on all

continuing medical education activities, quality improvement and reading literature). Relatively pronounced associations were found for the dimensions "presence of equipment" and "organization of quality improvement" (assessment with the help of data from the medical insurance, prescriptions, referrals and diagnostics). Indicators of those dimensions are represented in table 4.

TABLE 4. PRACTICE MANAGEMENT DIMENSIONS WHICH CORRELATE SIGNIFICANTLY WITH ACTUAL PERFORMANCE

Dimension 1: Hygiene^{1,2}

Presence in the examination room of:

- Sanitary pad
- Disposable baby diaper
- Bucket for used equipment
- Roller towel/disposable towels

Presence in treatment room of:

- 'Fenestrated sterile drape' minor surgery
- Routine for disinfection of table
- Use of gloves to clean instruments
- Use of indicator tape for sterilization

Dimension 2: Presence of equipment¹

Presence of:

- Fingersplints
- Nasal ribbon gauze
- Caustics to treat recurring epistaxis
- Intravenous fluid and giving set
- Plaster of Paris
- Test for microscopic blood in faeces
- Urine culture set
- Eyedrink
- Tonometer
- IUD insertion kit
- Electrocautery equipment
- Proctoscope
- Audiometer
- Electrocardiograph

Dimension 3: Use of equipment¹

Use or application by the GP of:

- Bladder catheter insertion (>1x/year)
- Peak flow meter
- Nasal forceps
- Disposable local anaesthetic eye drops
- Vibration tuning fork
- Microsc. exam. of skin snip for mycosis
- Microsc. exam. of clue cel trichomonas
- Taping a sprained ankle (>1x/ ½ year)
- Pressure gradient bandage in leg ulcer
- Q.I.-meter (Quelet Index)
- Stenopeic aperture
- 20D magnifying glass for fundoscopy

Dimension 5: Delegation medical tasks to assistant²

- Removing sutures
- Liquid nitrogen application to warts
- Ear syringing
- Venapuncture
- Exam./follow-up cardiovasc. patients
- Making ECG
- Audiometry
- Gluing small wounds
- Applying pressure gradient bandage in leg ulcer

Dimension 6: Lab-tests delegated to assistant^{1,2}

- Microsc. exam. urine sediment
- Blood sugar testing
- Test microsc. blood in faeces
- Counting leucocytes in blood

Dimension 15: Summary health problem/background^{1,2}

- Problem list
- Year of diagnosis
- Family history
- Basic data
- Profession of patient

Dimension 16: Recording using the SOAP system¹

- Reason for encounter (S=subjective)
- Results of exam. and investigations (Objective)
- Concise statement of the situation (Analysis)
- Plan/Action/Info (Plan)

Dimension 17: Recording of prescriptions¹

- Strength medication
- Dosage and administration
- Duration medication
- Actual medication of the patient retrievable

Dimension 20: Quality activities:^{1,2}

- Presence of a year report
- Assessment with the help of data of:*
- Medical insurance
- Prescriptions
- Referral letters
- Diagnostics
- Other feedback data

¹ significant relationship with medical performance

² significant relationship with communication with patients

"Time spent on direct and indirect patient care" (see table 3, page 80 dimension 21) did not correlate with the score on medical performance. Similarly neither "Service and organization", including accessibility, organization of the surgeries, availability, and organization of preventive activities, nor "Job stress" showed a significant correlation.

Five practice management dimensions correlated with communication scores of the Practice Video Assessment: "Hygiene", "Medical technical tasks delegated to the practice assistant", "Laboratory tasks delegated to the practice-assistant", "Recording basic data/problem lists" and "Organization of quality improvement activities". No significant correlations were found for "Service and organization" and "Workload and job stress". Overall, most associations were weak.

Table 5 shows the results of multiple regression analysis with the video assessment scores on communication with patients and medical performance as dependent variables and scores on the 22 practice management dimensions and data on the GP's (professional) characteristics as independent variables. The predictive value of practice management (R-square) for medical performance was moderate (22%) and the predictive value for communication was low (6%). The contribution of personal and professional variables of GPs to the explanation of variance in performance scores was low. Increasing age predicted lower scores on medical performance and working single-handedly predicted lower scores on communication with patients. "Organization of quality assessment" and "Tertiary activities", such as (individual) continuing medical education activities, predicted higher scores on medical performance. "Organization of quality assessment" explained most of the variation in medical performance (10%), followed by "Tertiary activities" (8%).

TABLE 5. MULTIPLE REGRESSION ANALYSIS (FORWARD); DEPENDENT VARIABLES: SCORES ON PRACTICE VIDEO ASSESSMENT (PVA), INDEPENDENT VARIABLES: SCORES ON PRACTICE MANAGEMENT DIMENSIONS OF THE VIP AND GPs' CHARACTERISTICS*

	Bêta	t	R	R Squared (adjusted)
<i>Medical performance PVA</i>				
Organization quality assessment	.39	4.05 ²	.32	.10 (.09)
Tertiary activities	.32	3.26 ²	.42	.18 (.16)
Age ¹	-.23	-2.37 ¹	.47	.22 (.19)
Collaboration with other careproviders	-.20	-2.06 ¹	.51	.26 (.22)
<i>Communication PVA</i>				
Delegated laboratory tests	.26	2.52 ¹	.25	.06 (.05)
Single-handed ¹	-.22	-2.13 ¹	.33	.11 (.09)

¹ p ≤ .05

² p ≤ .01

Discussion

To our knowledge this is the first study that analysed the relationship between GPs' communication with patients and medical performance (process) and practice management (structure) by observation in actual daily practice.

We realize that our study population is not representative, since GPs participated voluntarily. However, since our study is a methodological study, this non-representativeness is not a major problem. In addition, analysis of the relationship between structure and process within the same population using valid and reliable instruments allows for conclusions.

In our study we found a clear but limited relation between some aspects of practice management on the one hand and actual clinical performance on the other. A minority of practice management aspects did correlate with actual performance, but the contribution of these aspects to the explanation of variance in performance scores is low. Therefore we are tempted to conclude that for assessment process and structure are largely independent constructs and that good practice management does not guarantee good performance in general practice care.

Nevertheless, some results point to connections between specific structure aspects and process. This may have practical implications for practising GPs, for both implementation of assessment procedures into general practice and further research. Firstly, presence of appropriate equipment and adequate medical record keeping (dimensions 2, 3, 15, 16 and 17, see table 3) have a positive relationship with quality of actual medical performance. These appeared to be essential tools in the process of patient care. This may stimulate GPs to invest in diagnostic and therapeutic equipment and to keep adequate records. Secondly, time spent on (continuing) medical education (tertiary activities) is associated with GPs who performed well, which suggests that GPs' educational activities may lead to better care. Thirdly, the predictive value of organization of quality improvement, such as data collection on referrals and prescriptions, for actual medical performance pleads for quality assessment activities embedded in GPs' practices. Moreover, such good organization of data collection enables GPs to react accordingly in line with quality assurance principles.¹ Finally, with regard to the relation between communication with patients and specific practice management aspects, we hypothesize that delegation of tasks to the practice assistant and good record keeping (basic data, family history, profession of the patient) may be related to GPs' communication skills. The negative relation between working single-handedly and a high score of communication with patients, see table 4, may be explained by the contrasting difference with multiple partner practices, where collaboration must rely on communication and delegation of tasks within a team.

"Workload" and "Job stress" had no predictive value for performance scores, suggesting they are rather autonomous constructs. Neither was associated with actual performance or with practice management, the latter in line with previous research.²⁶

In previous assessment procedures, some aspects of practice management (structure) such as medical record keeping, data of prescriptions and referrals, have been used as indicators for actual

clinical performance.^{27,28} In our study these indicators indeed had a significant relationship with actual performance but explained little variance of actual clinical performance. The predictive value of personal (age) and professional (working single-handedly) characteristics for actual performance is limited, but in line with previous research.¹⁸

It is hazardous to draw definite conclusions from this study. Aspects of practice management are either essential catalysts for "good process" or the result of common characteristics of doctors who perform well, or even mirror images of each other.³ Further research of this relationship and the contribution of process and structure to patient outcome is required.

Most aspects of practice management had no predictive value for actual clinical performance. Therefore, practice management and actual clinical performance should be considered as relatively autonomous constructs requiring separate and comprehensive assessment to improve process and structure in general practice care.

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Chapter 6.

General practitioners' communication with patients: quality assessment by peers, patients or standardized patients?

Submitted as: General practitioners' communication with patients: quality assessment by peers, patients or standardized patients? Paul Ram, Michel Wensing, Jan-Joost Rethans, Sjoerd Hobma, Karin Aretz, Cees van der Vleuten and Richard Grol

Summary

Objectives-To determine to what extent assessment of General Practitioners (GPs) by peers, Standardized Patients (SPs) and real patients provide relevant information about GPs' communicative performance, from both the professional perspective and patients' perspective.

Design-Two groups of 43 GPs each went through a "Multiple Station Examination", i.e. a simulated surgery using SPs, and through a "Practice Assessment" in regular surgeries. GPs' communicative performance was evaluated by peers, SPs and real patients using scoring lists.

Setting-The south of the Netherlands

Subjects-86 Dutch GPs

Measures-The test score per GP, which was the mean score across all cases for each method. The correlation between the scores given by (standardized) patients and scores given by peer-observers (disattenuated bivariate Pearson correlations) in both surgeries. The significance level of differences between scores of both surgeries (possible time-order effects caused by the design).

Results-No correlation was found between the both surgeries, except for the patients' scores in one group. In the "Multiple Station Examination" SP scores correlated with the peer scores. In the "Practice Assessment" scores given by real patients did not correlate with peer scores. Real patients scores and SP scores were higher than peer scores. Only in the "Multiple Station Examination" peer scores in group 2 were higher than peer scores in group 1.

Conclusions-The quality of GPs' communicative performance in a simulated surgery may differ from GPs' communicative performance in real practice. In the simulated situation SPs were consistent with peers to some extent. Both real patients and SPs valued GPs' quality of communicative performance more positively than peers. Compared to SPs and peers, real patients may have a different perspective on the quality of GPs' communicative performance. In an assessment using multiple measures a possible time-order effect has to be taken into account.

Implications-Both the assessment setting, i.e. a simulated surgery or real surgery, and the type of evaluators, i.e. peers, SPs or real patients, have their impact on scores. Peer evaluation combined with patients' evaluation provides relevant information about GPs' communicative performance from both the professional perspective and the consumers' perspective.

Keywords: general practice, communication, (standardized) patients, assessment

Introduction

Communication between doctor and patient, such as exploring expectations and feelings, history taking, or providing information, is one of the cornerstones of clinical practice. Patients' compliance and satisfaction with care and even clinical outcomes are positively influenced by effective communication.¹⁻⁶ Both patients and general practitioners (GPs) feel that communication is important and that its quality requires more attention.⁷⁻⁹ However, GPs do not always acquire sufficient communication skills through their professional training and clinical experience.¹⁰ Therefore, additional training and quality improvement activities focused on GPs' communication skills may be required for the improvement of professional performance and for certification and recertification. As part of it, procedures are needed to assess the quality of performance in this area, since quality improvement depends on good understanding of the process and outcomes of care provision.^{11,12} Many quality assessment methods have been developed¹³ but which are valid, reliable and feasible for use on a broad scale?

Direct observation of GPs' actual performance in real practice approximates the real professional world as closely as possible and seems therefore to be the best approach to assess quality of communicating with patients.¹⁴ However, the case-mix of patients observed and the complexity of problems as usually presented in primary care is difficult to standardize, which may influence the findings.¹⁵ On the other hand, observation of GPs in a simulated situation can be standardized by using standardized patients (SPs) and cases, but the unnatural setting may influence GPs' performance and consequently the validity and reliability.^{16,17}

Any observation method requires a careful selection of "observers". In both real practice and in a simulated setting the observed communicative performance can be evaluated by well-trained peers, by standardized patients or by real patients. From a professional perspective, evaluation by well-trained peers is an effective method, since peers are the natural experts with respect to the communication process between GPs and patients. However, they may mainly represent the view of professionals on quality, which may differ from the view of "consumers", i.e. patients.⁴ Moreover, the use of trained peer observers involves high cost.

Standardized patients (SPs) proved to be able to evaluate GPs' performance while presenting complaints in a simulated surgery or visiting GPs in real practice.¹⁸ Compared with real patients, SPs are less emotionally involved in the consultation and they may be better able to use explicit criteria, especially when they are trained for their evaluation task.¹⁹ From this perspective, SPs may be more objective than real patients. The use of trained SPs, who are able to observe GPs while presenting their simulated complaints, involves logistic problems as well as high cost. Using real patients to assess GPs' performance might be an attractive alternative. This method is relatively cheap, if a written questionnaire is used and if patients are not paid for their contribution. The question is, however, whether real patients, being consumers, evaluate the communicative performance of their GP differently from SPs or peer-observers. Patients may use different criteria,

holding different beliefs and opinions on what constitutes good communicative performance in daily consultations.^{20,21} In addition, patients' evaluations of their GP's communication may be influenced by their emotional involvement in the consultation and by their overall satisfaction with the GP's care as a result of previous experiences. Moreover, being used to their doctor's working style, they may have few experiences with other GPs, which makes their evaluation rather subjective than objective.

This study explores different quality assessment methods, applied in both daily practice and a simulated situation, using real patients, standardized patients and peer-observers to evaluate the quality of GPs' communication with patients. The study focuses on the relationship between the methods used. In addition, differences and consistencies between peers, SPs and real patients in evaluating GPs' communicative performance have been analysed.

Methods

Subjects and design

All GPs in the south of the Netherlands were invited by letter to participate in this study and 220 (25%) reacted positively. For budgetary reasons 135 GPs were randomly selected, 100 of them to be assessed by observation, in both real daily surgery and a simulated surgery at the medical school, the other 35 served as peer-observers to assess GPs' consultations. Personal and professional characteristics such as age, gender, working full-time or part-time, working single-handed, or having a training practice were collected in order to determine representativeness.²³

The study design is presented in figure 1. First, GP-participants (N=100) were randomly divided in two groups of 50 GPs each, comparable on demographic characteristics, in order to check for time-order effects as well as for reasons of feasibility. Group 1 went first through a "Multiple Station Examination", a real life-like surgery at a medical school. A few months later these GPs went through the "Practice Assessment" of regular surgeries in daily practice. Group 2 did the same assessments, but in reverse order.

FIGURE 1. DESIGN

*observers

The Practice Assessment and the Multiple Station Examination

In the "Practice Assessment", the communication with all patients who gave informed consent was video taped during one week, using two cameras: one for the consultation room and one for the physical examination room. For the assessment by peers, a representative sample of 16 consultations was selected from a logbook completed by the GPs, using a "blueprint" reflecting the prevalence of diseases and complaints in primary care as well as possible.^{23,24} For the assessment by patients, about two weeks later, real patients were randomly selected and asked in the GP's waiting room to fill in a written questionnaire. The number of patients, minimum 15 and maximum 30, depended on the extent of the GP's working hours.

For the "Multiple Station Examination", eight cases were written by a panel of seven experienced GPs and portrayed by eight standardized patients (SPs). Again, the prevalence of diseases and complaints in primary care was reflected, including acute and chronic diseases as well as multiple problems. Rooms of the medical school were equipped as real-like surgeries and GPs were allowed

to bring in their doctors' bag. The GPs remained in their rooms while the SPs rotated from one doctor to another, schematically following a "time pressure design" of 12 minutes per doctor (96 minutes in total). All consultations were video taped. Participants were instructed to perform as naturally as possible.¹⁶ SPs evaluated the GP's communication immediately after each consultation, using a written questionnaire. The video taped consultations were assessed by peers.

Measurement instruments

Peer-observers evaluated the video taped consultations by using a previously validated instrument, containing 12 case-independent items (7-point Likert scale), called the MAAS-Global (Maastricht Anamnestic and Advice Scoring list-Global).²⁵ These items were derived from literature on effective communication between GPs and patients. Seven items refer to successive phases in a consultation: entry, follow-up consultation, exploration of patients' needs, communication on physical examination, evaluation and diagnosis, communication on management plan, evaluation of consultation. The five remaining items refer to general communication skills: providing information, exploring emotions, summarizing, ordering and empathy. An extensive list of detailed criteria is available to guide the professional assessors.²⁶ Reliability of the peer-observation, i.e. generalizability coefficients (Brennan 1983),²⁷ was 0.75 for the "Multiple Station Examination" and 0.83 for the "Practice Assessment".

Standardized patients evaluated GPs' performance after each case presented in the "Multiple Station Examination". Real patients evaluated GPs' performance, taken into account previous experiences with their GP. Both standardized and real patients used a written questionnaire, containing 10 case-independent items. Nine items of this list were based on eight indicators of the MAAS-Global: 1. exploration of patients' request for help ("wishes and expectations", item 1); 2. communication during physical examination ("touching with care and respect", item 2); 3. communication on management plan ("allows me a say in the choice of treatment", item 3); 4. ordering ("switches not too quickly", item 4); 5. providing information ("understandable information", item 5, and "checks my understanding of the information given", item 6); 6. summarizing ("gives different meaning to my words than I intended", item 7); 7. exploring emotions ("pays attention to my feelings", item 8); and 8. naturalness/empathy/attentiveness ("gives me the chance to tell my story", item 9). A final item concerning overall satisfaction was added ("completely satisfied", item 10). Items had to be scored on a 5-point Likert scale. Reliability, i.e. Cronbach's alpha, of patients' evaluation of communication was 0.90 for the "Multiple Station Examination" (SPs) and 0.71 for the "Practice Assessment" (real patients). Items of these questionnaires are presented in figure 2.

Figure 2: THE QUESTIONNAIRE NOTES ON PATIENTS' EVALUATION OF GPs' COMMUNICATION WITH PATIENTS.

1. *The chance to tell my story.* The doctor's attitude is open, interested, attentive and inviting. That is clear from his/her gestures and eye contact and in giving priority to you during the consultation.
 2. *Wishes and expectations.* You may have wishes relating to how a problem is handled, for example whether or not you are referred, whether or not you receive medicines, and especially regarding receiving good advice or explanation. Your previous experiences or information from a newspaper or via television may be the source for these wishes, just as they may be for feelings of pain.
 3. *Careful and respectful touching during the physical examination.* The doctor is polite and careful during contact, gives explanation and warns of possible pain in advance and reacts as necessary to your feelings of pain.
 4. *A say in what happens.* The doctor consults with you about how to tackle the problem. He/she says what should happen from the medical point-of-view, but takes your wishes and possibilities into account. The pros and cons and possible alternatives are discussed.
 5. *Too quickly from one subject to the next.* The doctor jumps from one subject to another. He/she doesn't let you know that he/she is going to change the subject. Because of the rapid changes you can't follow the consultation.
 6. *Checking the understanding of advice and information.* The doctor asks you for your reaction to information he/she has given you by asking questions such as "Do you understand what I say?" or "What do you think about it?"
 7. *Your words are interpreted differently from what you intended.* When he/she repeats or summarizes the information, the doctor does **not** express well what you mean or what you have.
 8. *Understandable information.* You do not get too much information at one go. Nor does the doctor use difficult or medical terminology. Difficult concepts are explained to you.
 9. *Sufficient attention to your feelings.* In every consultation feelings come up, as a result of memories, fear or happiness. The doctor asks about them, not too much, not too little, which helps to make the atmosphere of the consultation pleasant for you.
 10. *Fully satisfied.* You can indicate your general feeling of satisfaction with the consultation here. A good guide is asking yourself if you would be happy to return to this doctor should that be necessary or if you are happy to have/keep this doctor as your family doctor.
-

Analysis

All case scores in the "Multiple Station Examination" and "Practice Assessment" were calculated by summing the number of item responses for each case. All scores were expressed as percentages of the maximum score. The unit of analysis was the sumscore per GP, which was the mean score across all cases for a specific method. The correlation between SPs' scores, real patients' scores and scores given by peer-observers was assessed by calculating bivariate correlations (Pearson, corrected for attenuation, i.e. the unreliability of the instruments).

Bias caused by possible time-order effects was checked by calculating the significance level of differences between scores of the "Multiple Station Examination" and scores of the "Practice Assessment", between and within both groups (paired and unpaired T-tests), for peer-observation and standardized patients' evaluation and evaluation by real patients separately.

Results

In total ten participants (10%) dropped out arguing that "participation is too threatening" (1%), "on holiday" (4%) and "too busy to participate" (5%). Four participants were excluded because the response rate in the evaluation by real patients in daily practice was too low (<15). With respect to demographic variables the final study population (N=86) was representative for Dutch GPs, except for age (mean for Dutch GPs: 44.3 years, mean study population: 43.1 years, $p < 0.05$).

An overview of the mean scores for each of the two groups in both "Practice Assessment" and "Multiple Station Examination" is presented in table 1.

TABLE 1. COMMUNICATION SCORES: EVALUATION BY PEER OBSERVERS, REAL PATIENTS AND STANDARDIZED PATIENTS ON MULTIPLE STATION EXAMINATION AND PRACTICE ASSESSMENT

	group 1 (n=43)		group 2 (n=43)	
	mean (SD)	range	mean (SD)	range
<i>Practice Assessment</i>				
peers	41.3 (7.7)	25.8 - 62.4	42.1 (7.1)	29.5 - 63.9
real patients	84.0 (3.3)	73.7 - 90.3	84.9 (3.2)	79.6 - 92.2
<i>Multiple Station Examination</i>				
peers	45.0 (9.6)	27.7 - 68.2	52.0 (8.5)	35.7 - 67.3
standardized patients	80.9 (4.7)	71.3 - 92.5	81.0 (4.9)	70.0 - 89.8

In both groups peers gave lower average scores to the communicative performance than the patients ($p < 0.01$), while Standardized Patients (SPs) gave lower scores than real patients ($p < 0.01$). On the absolute figures, it can be concluded that both standardized patients and real patients felt that the

quality of communication was, on average, good, while peers felt that its quality was doubtful.

With respect to time-order effects, the "Multiple Station Examination" scores given by peers in group 2 were higher than the scores given by peers in group 1 ($p < 0.01$). However, SPs' scores in this station examination showed no difference between the two groups. So, a time-order effect was found only in one group, for one type of assessment and in one direction: from "Practice Assessment" to "Multiple Station Examination" evaluated by peers.

Table 2 represents the MAAS-global items, from which the patients' evaluation items has been derived. An overview is given of item scores, given by peers in both assessment methods, given by SPs in the "Multiple Station Examination" and scores given by real patients in the "Practice Assessment". Scores given by peers in the "Multiple Station Examination" are presented for each group separately, due to the time-order effect.

With regard to high scores, item 9 (naturalness, including "GP is empathic, attentive and inviting") was given the highest score by peers in both methods. Real patients gave their highest scores on item 9 ("the doctor gave me the chance to tell my story and to ask questions"), whereas standardized patients' rated this item second best. Rather high peer scores were given on item 2 (communication during physical examination) in both methods, whereas both SPs and real patients gave high scores on item 2 ("touches me with respect during physical examination") as well. So, both peers, standardized patients and real patients evaluated these aspects relatively similarly.

With respect to lower scores, both peers and standardized patients gave low scores on item 1 (exploration request for help). Scores given by real patients on this item was good in absolute sense but relatively moderate (sixth position). A similar pattern was shown in the scores on item 8 (exploring emotions): it was given the lowest score in both methods, except for peer scores in the station examination in group 1 (the last but one), whereas real patients gave relatively moderate scores on this item (and good scores in absolute sense).

From a relative perspective, for example, both standardized patients and real patients gave high absolute scores on item 5 ("the doctor checked if I had understood the advice or information"), but compared with other items of this list the scores on item 5 are relatively low (position eight for SPs' scores and lowest position for real patients' scores).

Finally, from the "additional" perspective, peers gave low scores on item 10 (the GP asks the patient if all questions have been answered and asks after patient's satisfaction about the consultation), which means that GPs hardly evaluated their consultations. Patients, on the other hand, proved to be satisfied by giving high scores on their item 10. So, within each method item scores given by peers, SPs and real patients may give additional information of GPs' communicative performance. Scores which are absolutely high may be relatively low.

Concerning the relationship between methods used, disattenuated Pearson correlations between the peer assessments and patient evaluations are presented in table 3.

TABLE 2. ITEMS AND SCORES (%) ON PATIENT'S EVALUATION AND PEER-OBSERVATION OF GPs' COMMUNICATION FOR PRACTICE ASSESSMENT AND MULTIPLE STATION EXAMINATION.

MAAS-Global items		PEER-OBSERVATION		PRACTICE		STATION EXAMINATION		PRACTICE		PATIENT'S EVALUATION	
				peers	peers' group 1	peers' group 2	stand. patients	real patients		indicate your opinion on the following statements:	
1.	Exploration request for help	- explores expectations - inducement of consultation now		22 ⁹	40 ⁸	37 ⁹	75 ⁹	84 ⁶		The doctor: 1. asks/asked about my wishes/expectations (concerning explanations, advice, prescription, etc.)	
2.	Physical examination	- instruction undressing/examination - treats patient with respect		58 ²	74 ²	86 ²	93 ¹	88 ²		2. touches/touched me during the physical examination with care and respect.	
3.	Management plan	- deliberation/proposal/compliance - alternatives/(dis)advantages		44 ⁶	49 ⁶	56 ⁶	68 ¹⁰	83 ⁷		3. allows/allowed me a say in the choice of treatment.	
4.	Ordering	- announcement - distribution available time		55 ³	62 ³	79 ³	82 ⁵	81 ⁸		4. switches/switched not too quickly from one subject to another.	
5.	Providing information	- small amounts/concrete - comprehensible language		46 ⁴	61 ⁴	61 ⁴	84 ⁴	86 ⁴		5. gives/gave understandable information (not too much, not too complicated).	
6.	Providing information	- asks about reaction - asks about comprehension		46 ⁴	61 ⁴	61 ⁴	77 ⁸	77 ¹⁰		6. checks/checked if I have/had understood the advice or information that has/had been given.	
7.	Summarizing	- concise/complete - correct for content		29 ⁷	44 ⁷	53 ⁷	85 ³	81 ⁸		7. gives/gave a different meaning to my words than what I intend/intended.	
8.	Emotions	- explores feelings - reflections of feelings		17 ¹⁰	29 ⁹	30 ¹⁰	79 ⁷	85 ⁵		8. pays/paid sufficient attention to my feelings.	
9.	Naturalness	- no hesitations - empathic/attentive/inviting		84 ¹	76 ¹	88 ¹	87 ²	92 ¹		9. gives/gave me the chance to tell my story and to ask questions.	
10.	Evaluation	- checks patient satisfaction - checks if questions are answered		23 ⁸	26 ¹⁰	38 ⁸	82 ⁵	88 ²		10. I am/was completely satisfied with the consultation(s).	

average score for each group separately due to order-effect
1-10 ordinal numbers

Table 3. DISATTENUATED PEARSON CORRELATIONS BETWEEN PEER OBSERVATION AND PATIENT EVALUATION OF COMMUNICATION IN PRACTICE ASSESSMENT AND MULTIPLE STATION EXAMINATION

	peers station		stand.patients station		real patients practice	
Group:	1	2	1	2	1	2
peers practice	.17*	.25*	.14*	.36 ¹	.08*	.12*
peers station	-	-	.51 ¹	.35 ¹	.07*	.04*
standardized patients station	.51 ¹	.35 ¹	-	-	-.06*	.18*

¹ $p \leq 0.05$

* not significant

Group 1: n=43

Group 2: n=43

In the "Practice Assessment" no significant relationship between peer scores and real patient scores in either group was found, whereas in the "Multiple Station Examination" there is a significant relationship between peer scores and standardized patient scores in both groups. In addition, in group 2 SPs' scores in the simulated surgery correlated with the peer scores in real practice. On the other hand, real patients' scores did not correlate with peer-scores in either methods nor with scores given by SPs in the "Multiple Station Examination". So SPs are consistent with peers with respect to scoring the quality of communication to some extent in a simulated situation; on the contrary, real patients are not consistent with either peers or standardized patients.

Discussion

This study investigated the relationship between different methods for quality assessment of the communicative performance of general practitioners (GPs), using three types of evaluating observers: peers, standardized patients (SPs) and real patients.

Five main conclusions can be drawn. First, the quality of GPs' communicative performance in a simulated surgery may differ from the quality of GPs' communicative performance in real practice. Second, SPs might be a substitute for peer assessment in a simulated situation to some extent. Third, both real patients and SPs valued GPs' quality of communicative performance more positively than peers. Fourth, real patients differ from both SPs and peers in evaluating the quality of GPs' communication substantially, since no correlation was found between their scores and either SPs' scores or peer scores. Finally, if different methods are used in comprehensive assessment, a possible time-order effect has to be taken into account.

The difference between GPs' quality of communicative performance in a simulated situation and GPs' quality of communicative performance in real practice is in line with results of a former study on GPs' medical performance in a simulated "competence" setting and in real practice.²⁸ GPs' communication with patients might be influenced by the unnatural setting and unfamiliar

standardized patients. The comparison between competence assessment by peers in the "Multiple Station Examination" and performance assessment by peers in the "Practice Assessment" has been described in detail.¹⁶ With regard to patients' evaluation, SPs proved to be consistent with peer-observers in assessing GPs' communicative performance in a simulated situation. SPs are trained persons, who meet many different GPs in relation to their patient role. They have a short and independent relationship with GPs, which is comparable with the observation "at distance" by peers. SPs in this study were healthy persons and, therefore, not anxious or worrying about the GP's final diagnosis. So, their evaluations probably compared more to the peer assessment than to the assessment by real patients. Real patients, on the contrary, may have less distance in the relationship with their GP. In addition, they seem to have a different perspective on GPs' communication with patients. Real patients may be more focused on the GP's final conclusion at the end of the consultation ("nothing to worry about" or "I'm afraid, I have bad news for you") than on the communication process itself.

From the educational perspective, peer observation or evaluation by standardized patients combined with the evaluation by real patients may provide relevant information about GPs' communication with patients. SPs represent both the patients' perspective by giving high absolute scores and the professional perspective by being consistent with peers. Evaluation by real patients is important, since they represent consumers' needs. On the other hand, the low scores given by peer-observers may be an effective stimulus for GPs to improve their communicative performance. With regard to high item scores, both SPs and real patients were consistent with peers on item 2 (care and respect during physical examination) and item 9 (including empathy and attentiveness) giving relatively high scores on these items. Concerning communication during physical examination, in our study physical examination was videotaped via a camera in the examination room in both methods, which enabled peers to score this important item. Patients' report on this aspect of GPs' performance seems to be a valid alternative. With regard to quality improvement activities, these aspects may have a low priority, since these were evaluated well in an absolute sense by peers, SPs and real patients. With regard to low scores, both peers and patients indicated that item 1 (exploration request for help) needed to be improved. In both methods, peers gave low scores to item 9 (exploring emotions). From the professional perspective, this aspect should be an area of special interest in educational activities. From the patient's perspective, item 3 ("GP allows me a say in the choice of treatment") and item 6 ("GP checks if I understood the information given") were given low scores, by both SPs and real patients. So, patients probably wish to participate in the choice of treatment more actively. A better check of patients' understanding of information given may be required. Therefore, GPs should pay attention to communicative aspects which have low patients' scores even when these have been evaluated well by peers and vice versa. Finally, peers gave low scores on item 10 (GPs' evaluation of consultation), whereas both SPs and real patients proved to be satisfied. This positive feedback is a compliment for GPs, but by not asking for it GPs miss this positive appreciation of their patients, a possible source of motivation in

daily work.

Some critical remarks should be made on our interpretations. First, SPs were sent the questionnaire with corresponding explanation one week before the "Multiple Station Examination" started. Real patients, on the contrary, were handed the questionnaire and a short written explanation in the waiting room at random. Second, real patients were asked to evaluate GPs' communicative performance, taking previous experiences with their GP into account, whereas SPs scored one consultation that they had just simulated. These methodological aspects may have influenced the consistency of scoring by real patients and the relationship between real patients' scores and scores given by peers. On the other hand, if both peers and real patients had been asked to score the same consultations, GPs' usual performance in daily practice might have been influenced substantially by such an intensive observation. This so-called "audience effect" might have influenced the validity of the quality assessment in practice. In addition, real patients probably evaluate their GP always having previous experiences in mind. The choice for the methods followed in our study was based on these assumptions.

To conclude, if the focus is on GPs' actual performance, the assessment should be preferably performed in real practice. In addition, if the focus is on the professional view, assessment of GPs' communication with patients should be preferably done by well-trained peer-observers, who are experts and not involved in the communication process. The use of SPs in a simulated situation can be a valid alternative, provided that they are trained in both presenting complaints and evaluating GPs' communicative performance. Real patients represent the consumers' view and should therefore be asked for their evaluation as well. Therefore, both uninvolved observers and involved real patients should be used in evaluating GPs' communication with patients. They both have to contribute valuable information which can be used in further quality improvement activities. Training real patients in evaluating GPs' communicative performance and the use of SPs in evaluating GPs' actual communicative performance by visiting GPs' practices may be attractive alternatives, which need further research.

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Chapter 7.

General discussion

Conclusions and recommendations for research.

Aims of the study

The aim of this thesis was to develop a valid, reliable, feasible and comprehensive procedure for assessment of practising general practitioners (GPs) for use in systematic quality improvement activities and to test this in practice. In the introductory chapter it was stated that the papers in this book concerned assessment in relation to medical education and that they were focused on three main aims.

The first of these was to develop a model for comprehensive assessment of practising GPs. A three-dimensional pyramid was constructed, representing three main domains of general practice care, i.e. medical performance, communication with patients and practice management, in relation to competencies and performance to be assessed, with primary care diseases classified in 17 chapters.

The second aim was to investigate the predictive value of competence-based assessment for actual performance. For this purpose, a video assessment procedure for observation of regular consultations in daily practice was developed. This method approximated the real professional world as closely as possible and was therefore considered as the "criterion".

The third aim was to analyze the relationship between the GP's practice management (structure) and actual performance (process).

Finally, GPs' acceptance of the assessment procedure and the feedback was evaluated.

The general conclusion of our studies contends that a valid and reliable comprehensive assessment of individual practising GPs should preferably include both an assessment method for direct (video) observation of GPs' communicative and medical performance in daily practice and a method for practice visitation to assess GPs' practice management. Written medical knowledge tests might be alternatives for use on a broad scale.

In addition to all the "discussion sections" in the preceding chapters, this chapter aims to extend these discussions and to give advices for further research in the field of assessment of practising GPs.

A new three-dimensional model for comprehensive assessment: The Pyramid Assessment Model

Following a literature study and discussions with experts a new pyramid model is proposed, which represents a combination of educational principles, assessment aspects and a compact domain description of general practice care (see figure 1).

FIGURE 1.. THE PYRAMID ASSESSMENT MODEL

In this model, the extensive domain of general practice care has been ordered into three main dimensions in general practice care: medical performance, communication with patients and practice management. These dimensions can be "connected" with patients' complaints and diseases, classified according to 17 main chapters of the International Classification of Primary Care (ICPC).¹ In relation to educational principles, the model reflects the current development of theoretical views on medical expertise, and takes account of the difference between competence and performance.^{2,3} The top of this pyramid includes actual performance (process) and practice management (structure).

This model proved to be an effective guide and blueprint in the selection process of test methods for

comprehensive assessment for our studies. It permitted a systematic analysis of the relationship between main dimensions on the performance level, i.e. practice management and actual performance (horizontal approach). Moreover, it enabled a systematic analysis to be made of the mutual relationship between competence levels and the relationship between competence levels and the performance level, for main dimensions separately (vertical approach), while also taking into account (the connection with) patients' complaints and diseases in primary care. In addition, the pyramid model was effective in facilitating international discussions about comprehensive assessment by medical educationalists effectively.

These benefits can be explained by the origin of the model. Three important existing models have been combined and reconstructed into one framework: Miller's pyramid, Donabedian's framework of structure, process and outcome, and Fabb's cube.⁴⁻⁶

The first model is based on educational principles whereas the other two models describe the domain of general practice care from different perspectives. We are convinced with our current experiences as a basis that our reduction of this wide domain to three main dimensions, i.e. medical performance, communication with patients (aspects of process) and practice management (structure), and the combination with educational stages (from competence to actual performance via knowledge (of skills) and demonstration of skills) in relation to internationally classified diseases in primary care, will enable others to assess GPs more effectively. Other (nationally accepted) classification systems than the ICPC can be used in this model as well, provided that such a classification includes all diseases presented in primary care.

Of course, being a reduction of reality this model has some limitations. First, "attitude" has not been presented in this model. Recently a Dudd study has started in order to define attitude in operationalizable terms. Therefore, in our study attitude has been left out of consideration. Second, patient outcomes, the final focus of quality improvement activities,⁷ have been assessed in our studies by using a questionnaire for real patients and standardized patients. However, these "outcomes" are not represented in our model, neither do other patient outcomes. Further study should be performed in order to include these patient outcomes in a model for assessment. We suggest, for example, an hour-glass model consisting of two vertically connected pyramids, the upper one our (upside- down) pyramid model including process and structure and below a mirror image pyramid "filled" by patient outcomes (Figure 2).

FIGURE 2. HOUR-CLASS MODEL FOR COMPREHENSIVE ASSESSMENT

Third, our model is rather global with respect to the three main domains, which means that both communication with patients, medical performance and practice management should be specified in more detail when it comes to actually assess GPs. On the other hand, a global model can be used in the assessment of other medical specialists as well. Third, physicians' "attitude" has not been included in this model separately. Behavioural aspects of attitude were an integral part of the observation instrument for communication.

Further experiences and study in the field of (continuing) medical education, quality improvement and vocational training may contribute to the definite value of this model as a useful basic blueprint for comprehensive assessment.

Video assessment in daily practice

In our studies, a valid, reliable and feasible method for video observation of the GP's performance in daily practice has been developed, particularly by addressing the "standardization problem", which is caused by the complex and unstandardized problems as they are actually presented in daily practice.⁸ Therefore, in an assessment experiment with the doctor as "dependent variable" these problems have to be considered as inconsistent "independent variables", which might be a substantial bias of measurement. The video assessment method is based on the idea that quality assessment should rather be based on collecting data of actual performance. Also content validity of an assessment method improves if the real professional world can be observed as closely as possible.⁹

In the "Practice Video Assessment", the standardization problem has been addressed by developing criteria for the selection of consultations which will be assessed. Each pre-determined selection criterion was met in the majority of the samples. In addition, all samples represented eight or more chapters of the classification of primary care. Within one chapter of this classification different diseases were represented as well. For example, in "chapter L" different diseases of the locomotive apparatus, such as diseases of knee, hip or shoulder, may be presented. Moreover, sufficient different sorts of consultations were included, such as initial and follow-up consultations with both elderly patients and children, male and female: in daily practice no consultation is the same.

Therefore, we conclude that content validity was sufficiently obtained and that the lack of control over the case selection process, one of the major disadvantages of observation in practice, was satisfactorily addressed by the procedure used. In addition, the case specificity problem, i.e. results on one case having a low predictive value for results on other cases,¹⁰ was addressed as well since 16 different cases were included in the sample.

However, there is still an area of tension between standardization of samples of regular consultations and reaching high content validity of the assessment model. One might argue that we did not succeed in a complete standardization, since only criterion one, representativeness of eight or more classified chapters of diseases, was met in all samples. Three criteria were fully met in slightly more than 90%, and another three criteria in just over 70%. It is hard to define which percentage level can be considered as sufficient, to allow the conclusion that the sample has been "standardized". Strict sample uniformity may even not be desirable, since a sample has to be representative for an individual GP. It should reflect existing differences between GPs regarding characteristics of their patient population, workload, working style and their perception of tasks. In addition, there is a relation between standardization, reliability and feasibility, since strict standardization may improve reliability results. If fewer cases and raters are needed for a reliable assessment, feasibility will improve by reduction of cost and logistics. In our opinion, the question about standardization cannot be answered definitively. In practice, there will always be differences in sample characteristics. One should limit these differences by using selection criteria and the influence of differences on GPs' scores should be analysed afterwards. Our selection criteria were formulated on the supposition that 16 consultations would have to be selected. An assessment using another sample

size requires that sample criteria have to be adjusted and checked accordingly.

In this study, only the sample characteristic "variation in total duration of consultations included per GP" showed an influence on the scores. A limitation of the variance in the duration of consultations, for example by changing the selection criterion "duration of each consultation between 5 and 15 minutes" into a "duration between 8 and 12 minutes", might improve the standardization. However, this alternative might decrease validity, since the duration of the sample may reflect GPs' working style. Further research of sampling by using selection criteria is needed in order to improve reliability and consequently feasibility, taking into account validity aspects.

Follow-up consultations and consultations with more than one reason per encounter caused specific scoring problems. A follow-up consultation without the GP's verbal recapitulation of complaints and the management planned in the previous consultation(s) was difficult for peer-observers to score, who risked possibly missing both the context and the past history. This could be solved by combining the video observation with medical record review. However, medical records are often incomplete and inconsistent, which may raise other problems.¹¹ This problem could be addressed by comparing the reliability results of two kinds of observation: one with observers having insight into the medical records and one with observers who are blinded for patients' medical history.

Another problem with scoring at the level of consultations concerned consultations with more than two reasons for encounter. These consultations were now given an average score, i.e. the average of the reasons encountered, globally calculated by the peer-observer. In the regression analysis, the sample characteristic "a maximum of two consultations with more than two reasons for encounter" had no predictive value for the performance scores, suggesting that such an amount of these types of more complex consultations within the sample had no influence on the final sum score per GP. Nevertheless, such consultations and even consultations with two reasons for encounter, frequently present in daily practice, may give rise to some problems in both scoring and giving feedback to the GP. An average score may represent a "neutral" score, based on a high score on one complaint of the patient and a low score on another complaint. Especially for the medical components of the consultation this may lead to a loss of educational information. Exclusion of these consultations from the final assessment would "solve" this problem, but would decrease content validity at the same time. A specific separate score for the medical component for each reason of encounter might improve feedback. The communication score could remain an average score, since this score is based on items, which are more case independent. These questions need further research.

Validity of the video method improves as a result of the use of two cameras, recording the consultation as completely as possible, including both physical examination and communication with patients. Video assessment procedures usually do not record physical examination. Both technical reasons and respect for patient's privacy may account for this choice. However, physical examination and concurrent communication with patients are essential aspects in daily consultations. On the other hand, switching cameras by the GP intrudes on normal surgery routine. GPs may get used to the operation of the video equipment after a few consultations, specially when the

equipment is continuously installed in the practice, decreasing this audience effect. An automatic switching system however may solve this problem even more.

To draw conclusions on validity, in any assessment using regular consultations selection criteria have to be formulated. The aim of the assessment, either educative or summative, may influence the precision by which the selection criteria will be applied. Strict standardization will benefit for reliability and feasibility (fewer observations needed), but may hamper validity. The influence of differences in sample characteristics on GPs' scores should always be analysed retrospectively in order to check for validity and to compare GPs fairly.

As far as the reliability of the assessment is concerned, our results are encouraging, particularly considering the limitations in standardization of practice assessment. After two-and-a-half hours of observation by two observers, the generally accepted benchmark of >0.80 for reliability coefficients was reached. This is actually comparable with or even better than test conditions using highly trained standardized patients in multiple station examinations.¹² Our good results may be explained by the consistency of GPs' usual performance during video recording, confirmed by GPs recognizing their usual working style in the consultations. One might argue that "real patients" probably guarantee "naturally acting doctors", which is a positive argument for both validity and reliability.

Efforts to improve reliability should therefore primarily be focused on observer training. Both observers and sample criteria are the most important aspects of standardization, since complex daily cases and natural patients cannot be standardized. From this perspective, reliability (and validity) benefits from the availability and use of guidelines for both communication with patients and medical performance. In the Netherlands, more than sixty generally accepted guidelines for medical performance have become available so far, concerning diseases in primary care with high incidence and prevalence.^{13,14} In our study, criteria formulated on these guidelines have been used by the observers in evaluating GPs' medical performance on specific diseases, such as asthmatic bronchitis, otitis media, hypertension and eczema. In this way observers may evaluate medical performance more consistently, provided that they have good knowledge of these guidelines criteria. In our study, observers were also assessed by a written medical knowledge tests, containing questions based on the guidelines mentioned. The average scores of these observers were sufficient. For communication with patients, generally accepted guidelines have only recently become available.¹⁵ At the start of our study these guidelines had not been published yet. Therefore, an extensive list was used, containing criteria for the 12 items for communication on the MAAS-Global, the observation scoring list used.¹⁶ With regard to this instrument, one might argue that there is an imbalance between the number of items for communication (12) and for medical performance (4). Medical performance was evaluated on history taking, examination, evaluation and patient management. A further differentiation of these items, for example history taking into somatic history taking and psychosocial history taking, examination into examination during consultation and complementing examination after consultation (ECG, gastroscopy, blood, x-rays, etcetera), patient management into medicinal and non-medicinal treatment, the latter into primary and secondary preventive activities and advices, etcetera, might be considered in order to score

medical performance in more detail and to provide more specific feedback to the GPs assessed. However, complex scoring issues may arise, since the indication to perform on these aspects may differ from one consultation to another, probably leading to a frequent "not applicable score", which hampers a fair comparison of GPs' average medical performance scores.

Nevertheless, further development of generally accepted guidelines for both communication with patients and medical performance is needed in order to improve both actual performance, its assessment and feedback.

With regard to feasibility, a valid and reliable video assessment in daily practice justifies considerable investment. In this study, the purchase and the installation of the video equipment was a substantial percentage (25%) of all investment costs in the Practice Video Assessment. Costs will be reduced provided that each GP has his or her own video equipment. The prevention of acts of violence in the practice may be an additional benefit of the continuous presence of this equipment. Compared with observation in a simulated surgery at the medical school using standardized patients, video assessment in daily practice is relatively cheap, since no technician, standardized patient, travelling cost or rent for rooms and equipment have to be paid for.

Finally, privacy of both GPs and patients should always be guaranteed. In this study informed consent was well organized at the desk before the consultation, which may be responsible for the high consent percentage. Transport of tapes was performed either by couriers or by registered letters, labelled medical secret. In this way no videotapes were lost.

The predictive value of competence-based tests, i.e. a multiple station examination and knowledge tests, for actual performance

Two different types of competence-based tests were selected for this study in order to analyze their predictive value for actual performance: written knowledge tests and a multiple station examination using standardized patients. The predictive value of those tests for actual performance was compared.

As a result, medical knowledge tests predicted actual medical performance to the same extent as a multiple station examination using standardized patients, whereas the communication component of the multiple station examination did not predict GPs' actual communication with patients.

Moreover, the multiple station examination and the Practice Video Assessment, both being observation methods, were compared on aspects of validity, reliability and feasibility. Content validity of practice video assessment proved to be superior to the station examination since the domain of general practice was better covered. Participants judged the videotaped practice consultations as "natural", whereas hardly any GP recognized his usual working style in the station examination, after self reviewing the videotaped consultations. Concerning concurrent validity, only the medical component of both methods proved to correlate. Also real practice performance proved to be less influenced by the "audience effect",¹³ thus more stable, than behaviour during the station examination. Reliability of both methods, expected to be better in the controlled station

examination, was comparable. Moreover, the organization of video assessment in practice was more flexible, had lower cost involved and was better accepted by GPs than the station examination. So, overall, assessment of GPs by video observation in daily practice proved to be superior compared with (video) assessment in a simulated setting using standardized patients.

Therefore, assessment in a simulated surgery at the medical school has limited value when the focus of the assessment is on actual performance, since the predictive value for actual communication is negligible, the predictive value for actual medical performance is comparable with medical knowledge tests and both content validity and acceptance of this simulated surgery by GPs is low.

Does this imply that simulated surgeries are worthless now? No, we don't think so. We argue that the aim of the assessment is an important issue in the selection of methods. For instance, simulated surgeries using standardized patients will still have their educative value in skills training. In addition, standardized patients can be used in daily practice for educative purposes as well.

If the focus of assessment is on actual performance, one needs to go into the practice and should observe the GP's communication with patients and medical performance in regular surgeries.

Also, on grounds of feasibility, i.e. cost, logistics, high number of participants, written knowledge tests may be an appropriate alternative: these can be used on a broad scale and have a predictive value for actual performance, which is comparable with a standardized examination in a simulated surgery. In relation to the pyramid assessment model described in chapter 1, good knowledge tests should cover both medical aspects, communication with patients and practice management aspects. Finally, knowledge tests may be better predictors for actual performance than demographic variables of GPs. In this study, of all personal characteristics of GPs such as age, gender, working single-handed, being member of the Dutch College of GPs, working full-time or part-time, working in a urban area or not, only the characteristic "working single-handed" contributed (negatively) to the explained variance of the actual communication with patients. This contribution was low, whereas on medical performance there was no contribution at all. Therefore, time spent on administration and analysis of the influence of personal and professional characteristics on performance scores seems largely superfluous. One would possibly do better by performing a written knowledge test.

Still, a few critical remarks concerning written knowledge tests should be made. In relation to validity, items in the knowledge test should focus on "key-features": knowledge elements that are crucial to general practice care. The knowledge concept in a test should be specified. Furthermore, items should cover relevant aspects of realistic patient problems.¹⁷ In relation to comprehensiveness, more attention should therefore be paid to the development of valid and reliable knowledge tests for communication with patients and practice management.

The reliability of knowledge tests used is too low for conclusions at the level of individual GPs. Adding more items, for example doubling the test size to 300 items, or a sequential administration of two or more tests would increase reliability. However, feasibility would decrease in this way. If these tests are used for selective purposes, reliable pass-fail decisions can be calculated without

adding more items. In addition, the reliability of group mean scores is far better than the reliability of individual scores, which means that the reliability for screening purposes, i.e. the selection of topics for educational activities for a group of GPs, might be sufficient.

The predictive value of knowledge tests on communication and practice management for actual performance and practice management deserves to be studied as well in order to cover the domains of general practice care as completely as possible by written knowledge tests.

In this study, knowledge tests were completed at home. Feedback was given in a "norm referenced" (relative) way, i.e. individual scores were compared with scores at peer group level. If one is interested in how well scores actually represent mastery of knowledge, the "absolute perspective" is of paramount importance.

One might argue that the completion of these tests at home may be a source of cheating. However, the assessment was purely educative and GPs were asked not to look upon things for their own benefit, i.e. a valid feedback. The considerable correlation between the knowledge tests and the Practice Video Assessment support our hypothesis that GPs did not cheat their results of the knowledge tests. GPs who would have high scores in the knowledge test by cheating might have had low scores in the Practice Video Assessment, since they would have had less knowledge to hand.

Overall, competence-based tests, such as knowledge tests and multiple station examinations, do predict actual performance. In our study the explained variance in actual performance by these tests was moderate (about 25%). Therefore, these tests approximate actual medical performance but they still keep at a considerable distance from actual performance. Depending on the aim of the assessment and budgetary facilities, a choice should be made between a multiple station examination (high cost) and a knowledge test (lower cost). If the focus of the assessment is on evaluation of actual performance, direct observation in daily practice is to be preferred.

The relationship between actual performance (process) and practice management (structure) in general practice care

An important conclusion of this study is that practice management (structure) and actual performance (process) seem largely independent constructs. Quality improvement and assessment activities should emphasize that the relationship between practice management and actual performance is weak. Structure and process may contribute to patient outcome largely independently from each other. In our study, only a few practice management dimensions have a predictive value for actual performance. Of course, structural deficiencies, such as inaccessibility of the practice, lack of telephone or equipment, will hamper quality of care. However, in almost all of the practices these "basic" essential structural aspects are available and accessible, which means that they do not discriminate between GPs. As a matter of fact, a well organized practice with good management does not guarantee a good clinical performance.¹⁸ For example, even when perfect equipment is available in the practice, it may still be questionable whether a GP uses the equipment

adequately or not. Only in the process, i.e. in regular consultations, can the quality of the GP's use of structural aspects such as equipment or medical records be observed and evaluated.

Nevertheless, when studied in more detail, nine of 22 practice management dimensions correlated significantly with medical performance and so did five dimensions with actual communication with patients (see table 3, page 72).¹⁹ Overall, most associations were relatively weak and the predictive value for actual performance was low. Of all personal characteristics, only "age" in the case of medical performance and "working single-handed" in the case of communication contributed to the explained variance. The contribution was lower than specific scores on some practice dimensions. For example, one practice dimension (delegation of medical tasks to the practice assistant) explained six percent of variance in communication with patients. Organization of quality assessment activities, such as data collection on referrals and prescriptions, explained most of the variation in medical performance (ten percent). Overall, variance in medical performance scores could be explained by only three practice management dimensions. From this perspective, one should be cautious to use practice management aspects as performance indicators.²⁰

On the other hand, conclusions can be drawn from the positive relationship between actual performance and some practice management dimensions. Firstly, the presence of appropriate equipment and adequate medical record keeping can be seen as essential tools in the process of patient care. This may stimulate GPs to invest in diagnostic and therapeutic equipment and to keep adequate records. Secondly, time spent on (continuing) medical education (tertiary activities) is associated with doctors who perform well, which suggests that GPs' educational activities may lead to better care. Thirdly, the predictive value of "organization of quality improvement" for actual medical performance pleads for quality assessment activities embedded in GPs' practices.²¹ Good practice of the organization of data collection, such as data on prescriptions, referrals or diagnostics, enables GPs to react in accordance with quality assurance principles, i.e. the process of evaluating the current level of performance and the process of change and improvement.²²

Overall, we conclude that some structural (practice management) aspects may indicate quality of performance, but the indication is weak. So, assessment of process, i.e. GPs' medical performance and communication with patients, should be included into a comprehensive procedure.

Finally, with regard to the relation between GPs' communication with patients and specific practice management aspects, delegation of tasks to the practice assistant and good record keeping (basic data, family history, profession of the patient) may have some roots in GPs' communication skills. The negative relation between working single-handed and high score of communication with patients may be connected with the contrasting difference between working single-handedly and working in multiple partner practices, where collaboration must rely on communication and delegation of tasks within a team. These hypotheses need further research, since communication with patients is an important dimension of general practice care. Patient outcomes will benefit from good communicative performance.

"Workload" and experienced "Job stress" had no predictive value for performance scores, suggesting that they are rather autonomous (perhaps personal) constructs. Neither were associated with actual performance or with practice management. The instrument used may not have measured what it was supposed to measure and may therefore be invalid. It is hard to ignore the possible (negative) effects of the GP's feelings about work (and life) on the quality of performance. Therefore, further research on these aspects is necessary.

It is hazardous to draw definitive conclusions from this part of our study. Aspects of practice management are either essential catalysts for "good process" or the result of common characteristics of doctors who perform well, or even mirror images of each other. Further research of this relationship and particularly research on the contribution of process and structure to patient outcome is required.

Assessment of GPs' performance by peers, standardized patients (SPs) and real patients

In our study we explored the assessment of GPs' communication with patients by peers and standardized patients (SPs) in a Multiple Station Examination and by peers and real patients in a Practice Assessment. In absolute sense, both real patients and standardized patients gave higher scores than peers. With regard to the relationship, i.e. Pearson correlation, between peers and both standardized patients and real patients, SPs proved to be consistent with peer-observers to some extent in assessing GPs' communicative performance in a simulated surgery, whereas real patients were not consistent with peers in the Practice Assessment.

We hypothesize that SPs have a short and independent relationship with GPs, which may be comparable with the observation "at a distance" by uninvolved peers. In addition, in this study SPs were healthy persons and, therefore, not anxious or worrying about the final diagnosis. Real patients, on the contrary, may be more distressed and, therefore, have less distance in the relationship with their GP. Real patients may be more focused on the GP's final conclusion at the end of the consultation than on the communication process itself. In addition, they seem to have a different perspective on GPs' communication with patients than professionals, since no correlation was found between peer scores and scores given by real patients in the Practice Assessment.

From an educational perspective, peer observation or evaluation by standardized patients combined with the evaluation by real patients give additional information about GPs' communication with patients. Evaluation by real patients is important, since they represent consumers' needs whereas peer scores, and to some extent SPs' scores, represent the view of professionals. In addition, the low scores given by peer-observers may be a better stimulation for GPs to improve their communicative performance than the relative high scores given by patients.

The differences between the evaluation by standardized patients and peer-observers on the one hand and the evaluation by real patients on the other may be influenced by methodological aspects of our study. Peers were trained extensively in observing and evaluating GPs' communicative performance, whereas SPs were experienced in observing and evaluating the communication skills

of medical students. Real patients were not trained at all in evaluating the communication process between their GP and themselves. SPs were sent the questionnaire with corresponding explanation one week before the start of the Multiple Station Examination and they evaluated about a hundred GPs. Real patients, on the other hand, were handed the questionnaire and a short written explanation in the waiting room at random and they evaluated only their "own GP". Moreover, real patients might have taken previous experiences with their GP into account, while scoring the communicative performance of their GP. The relationship between real patients' evaluation and peers' evaluation might be influenced as a consequence.

With regard to the ranking of item scores by peers and patients, the item "exploring emotions" on the peer scoring list was lower ranked than a similar item "asks about my feelings" within both patients' scoring lists. This makes it questionable whether patients do wish GPs to explore patients' feelings more extensively. On the other hand, the item "the GP allowed me a say in the choice of treatment" was evaluated relatively low, both by standardized patients and real patients', which suggests that patients would like more participation in the choice of treatment.

To conclude, if the focus is on the professional view, assessment of GPs' communication with patients probably concerns "process". If so, it should be preferably done by well-trained peer observers, who are experts and, being at distance from the observed colleague, not involved in the communication process. The use of SPs in a multiple station examination can be a valid alternative, provided that they are trained in both presenting complaints and evaluating GP's communicative performance. Real patients represent the consumers' view and their evaluation might be considered as "outcome". Therefore, both disinterested observers and involved real patients should be used in evaluating GPs' communication with patients. Effects of training real patients in evaluating GPs' communicative performance and the effects on item scores need further research. In addition, the use of SPs in evaluating GPs' actual communicative performance by visiting GPs' practices may be an attractive alternative which should be studied as well.

The evaluation of the comprehensive assessment procedure by GPs

GPs' acceptance of the comprehensive assessment procedure was evaluated with a questionnaire, which contained four main questions concerning the following aspects: 1. the benefit of participation in the assessment versus the effort required; 2. the effects of the assessment and feedback on GPs' insight into their way of functioning; 3. GPs' plans for concrete changes in daily practice care and 4. GPs' educational activities as a result of participation (see table 1.). In addition, GPs' preferences for methods used and for the way of getting feedback were evaluated as well.

TABLE 1. ANSWERS ON EVALUATION QUESTIONNAIRE IN PERCENTAGES GPs AGREEING

Questions:	Knowledge Tests			Multiple Station Examination			Practice Video Assessment			Visitation Practice Management		
	Part*	Obs*	Con*	Part	Obs	Part	Part	Obs	Part	Part	Obs	Part
1. The effort of participation (observation) was balanced by its benefit.	69.2	68.0	62.6	75.2	82.6	77.0	84.2	84.2	77.2	77.2		
2. The assessment gave me insight into my way of functioning on:												
2.1. Medical performance	73.0	69.0	63.0	68.0	76.6	69.8	71.8	71.8	-	-		
2.2. Communication with patients	-	-	-	77.4	87.4	79.6	83.8	83.8	-	-		
2.3. Practice management	-	-	-	-	-	-	-	-	80.0	80.0		
3. Observation/participation and feedback made me plan concrete changes on:												
3.1. Medical performance	41.3	20.0	24.2	33.5	20.8	23.6	21.4	21.4	-	-		
3.2. Communication with patients	-	-	-	39.3	75.0	55.1	67.9	67.9	-	-		
3.3. Practice management	-	-	-	-	-	-	-	-	72.5	72.5		
3.4. I made no plans at all	52.2	66.7	69.7	52.8	20.8	40.4	25.0	25.0	25.0	25.0		
4. Observation/participation and feedback led to educational activities on:												
4.1. Medical performance	34.8	20.0	17.2	16.9	8.3	17.0	14.3	14.3	-	-		
4.2. Communication with patients	-	-	-	19.1	25.0	20.5	21.4	21.4	-	-		
4.3. Practice management	-	-	-	-	-	-	-	-	25.0	25.0		
4.4. I had no medical education activities in relation to the assessment	59.8	73.3	82.8	71.9	75.0	72.7	75.0	75.0	75.0	75.0		

Part*: assessed GP-participants (n=92)

Obs*: peer-observers (n=29)

Con*: GPs control group (n=32)

-: not applicable

On question 1 (benefit versus effort), a majority of GPs viewed a positive balance between benefit and effort of participation. Even peer-observers, who had to score about 100 consultations each, were highly positive about their benefits due to their observation efforts. GPs in the control group, who participated in the knowledge tests only, viewed the balance as less positive than observers and assessed GPs.

Answers on question 2 (insight into my way of functioning) showed a moderate score for GPs in the control group on the knowledge tests, whereas observers and assessed participants viewed both the medical knowledge test, the multiple station examination and the practice video assessment as methods which gave them insight into the way of functioning, the latter two for communication aspects particularly. A high score too was found for the participants in the practice management method with regard to their insight into their practice management.

Question 3 (plans for concrete changes) shows a high score for all groups on "I made no plans at all for concrete changes" as an effect of the knowledge tests and, less negatively, of the multiple station examination. Both assessed GPs and observers are strikingly positive in making concrete plans on communication aspects as a result of the practice video assessment. Observers are even more positive on this issue in the multiple station examination than in the practice video assessment. The highest score on this question was given by GPs on practice management (75% of the GPs reported making concrete plans for changing aspects of practice management).

On question 4 (activities on medical education) a majority of all GPs said that they initiated no activities at all as a result of the assessment, no matter what assessment method was used. Comparatively, the knowledge test did have some effect in making GPs active in medical education activities.

The question "What kind of medical education activities were performed due to the assessment and its feedback?" showed that GPs performed individual educational activities mainly, i.e. self-directed learning (assessed GPs 40%, observers 20%) and immediate changes in performance or practice management (assessed GPs 40%, observers 48%). In addition, 35% of the assessed GPs and 20% of the observers confirmed that they performed regular continuing educational activities and 30% of the GPs and 17% of the observers said that they performed medical education activities within the local GP group. On all these items GPs in the control group were less active than the assessed GPs and peer-observers. As the results show, peer-observers were activated by their observation to lesser extent than their observed colleagues, except for immediate changes in performance.

GPs' preference for assessment methods to be included in a comprehensive procedure favoured the combination of video-assessment in daily practice (focused on both communication with patients and medical performance) with an assessment of practice management by visitation and a written medical knowledge test.

Table 2 shows that a majority of all GPs prefer a combination of written and oral feedback. In addition, GPs showed no distinct preference for the sort of person who should mediate the feedback. There is a slight preference for an unknown colleague, provided that it was a GP.

TABLE 2. GPs' PREFERENCES FOR FEEDBACK METHODS IN PERCENTAGES

Feedback method:	participants (n=92)	control group (n=32)	observers (n=29)
written	18.1	43.7	20.7
oral	12.8	6.3	13.8
combination	69.1	50.0	65.5
Mediator:			
unknown colleague	24.2	18.8	13.8
known colleague	6.6	9.4	6.9
non-GP consultant	11.0	6.3	3.4
no preference	58.2	65.5	75.9

These results may have been influenced by the decision to give limited feedback after each method in order to prevent a possible order-effect: feedback on one assessment method could influence GPs' performance on the next method. Since the study was a methodological one and focused on psychometric characteristics of different methods only, feedback played a secondary role.

All feedback was presented to the GPs in written letters only, except for the results on the assessment of practice management where feedback was mediated by a consultant as an implicit part of the assessment procedure. Such feedback is known to be more effective than written letters.²⁴ Therefore, educational effects of such a comprehensive assessment procedure might increase if feedback is mediated by a consultant on each method.

In addition, two more critical remarks should be made in relation to the educational impact. Firstly, there was no offer of regular medical education programmes based on the results of the assessment, which may have hampered adequate educational activities at group level. Secondly, the assessment procedure was not systematically embedded in quality improvement activities. The "quality circle" correctly started in practice observation and collecting data from practice. However, the next stages of this circle have not been performed; these would cover the evaluation of information (performance versus targets) including setting priorities in implementing changes, the agreement of criteria including setting target standards and a subsequent observation of practice to evaluate changes. In this study, priorities had to be set as well.

Finally, the educational effects of training and observations by peers are encouraging. Further research on these aspects is necessary.

The educational character of the assessment and the voluntary participation may be responsible for the positive commitment and acceptance by all GPs. Drop-out was extremely low. Compulsory or selective assessment may decrease this acceptance, which has to be taken into account in the development of assessment procedures.

GPs' preference for video assessment in daily practice and assessment of their practice management by visitation in combination with a written medical knowledge test fits perfectly in with our results on the psychometric characteristics of performance-based assessment in daily practice. In this way

GPs confirm that assessment should gather data from daily practice care according quality improvement principles and recent assessment strategies to approximate the real professional world as closely as possible.

Further study of the educational effects of comprehensive assessment for both observers and observed GPs is of great value, especially when such an assessment is embedded in regular quality improvement activities. A well designed trial which includes both assessment and all other phases of a quality plan may yield more insight into the educational value of comprehensive assessment.

Overall conclusion

From the educational perspective, a valid comprehensive assessment procedure should include at least (video) observation of GPs' performance, a visitation to assess practice management and feedback linked up with systematic quality improvement. Written knowledge tests are good alternatives for screening purposes. Analysis of data focused on patient outcomes, an important issue in quality assessment, was beyond the scope of our work. This study provides a substantial contribution to formal implementation of valid, reliable and feasible comprehensive assessment procedures. Further research is needed in order to improve the quality of general practice care by assessment, focused on process, structure and patient outcomes, taking advantage of the driving force of assessment.

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Summary

Quality of care in general practice has evolved into a new important field of work and research including research on quality assessment, i.e. the process of evaluating the current level of performance of General Practitioners (GPs), and quality improvement. The assurance of good quality of care in general practice requires a continuous repetition of the process of quality assessment and improvement. Within this frame, the idea of formal (re)assessment of practising GPs is becoming more and more an accepted fact, although a formal assessment procedure enabling a systematic valid, reliable and feasible assessment of practising GPs is still lacking. This educational study focuses on the development of such an assessment procedure that can be used as part of quality improvement in general practice.

The introduction of this thesis contains a description of the research problem at hand, the area of assessment of GPs and the high-stake issues in this field. This is followed by the research questions and the study design. It is obvious that no single assessment method can cover the extensive and complex domain of general practice care. Therefore, a comprehensive assessment approach is needed. It is also made clear that no assessment model exists which is able to cover all aspects of general practice care such as communication with patients, medical performance and practice management including GPs' knowledge and skills. It is concluded that it is desirable to develop such an assessment model, which can be used as a blueprint in the selection of assessment methods. Further, appropriate methods for the assessment of each separate aspect of general practice care are needed. It should be established under which conditions the assessment is best to be conducted. Should it take place in clinical practice, in a simulated situation, or by means of direct observation or by indirect tests such as written papers?

The relationship between the scores of different methods is unclear as is the predictive value of scores of written tests or tests in a simulated situation for actual performance. The relationship between process, i.e. communication with patients and medical performance, and structure, i.e. practice management, and the relationship between competence (knowledge and demonstrated skills) and actual performance are questionable as well.

Three research questions were therefore formulated on the development and testing of an appropriate model for comprehensive assessment of practising GPs, including different methods, which should cover the domain of general practice care as completely as possible. More specifically the following research questions are addressed:

1. What would be an appropriate model for comprehensive assessment of practising GPs, which covers the domain of general practice care as completely as possible?
2. To what extent do competence-based tests predict actual clinical performance?
3. What is the relationship between the GP's practice management (structure) and actual clinical performance of GPs in that practice (process)?

The study design showed the following steps (see figure 1 page 16). First, a literature search was carried out into models and blueprints for assessment of family practice care, leading to a new pyramid assessment model. Second, existing assessment instruments and methods were screened on their psychometric qualities, i.e. validity, reliability and feasibility. The methods with the best psychometric characteristics were selected for the main study by using the pyramid model. Third,

in a cross sectional study, GPs were assessed comprehensively. Knowledge tests were completed at home first, followed by a randomization of participants in order to control for order effects. Three groups of 50 GPs each, two groups of participants and one control group, comparable on personal and professional characteristics and on results on the knowledge tests, were formed. Group 1 and 2 were observed directly in both a simulated situation and daily surgeries, but in reverse order. Consultations were scored by peer-observers (N=35) on both medical performance and communication with standardized patients in the simulated situation and with real patients in daily practice. These patients participated as evaluators of the communication component as well. After observation of actual performance, GPs' practice management was assessed by non-physician observers visiting the practices. Finally, participants were sent a questionnaire about their acceptance of each method and their educational activities and plans as a result of their participation in the assessment and the feedback received.

Chapter 1 describes the development of a theoretical and practical model to be used as a blueprint for comprehensive assessment of practising GPs, taking into account recent views on medical expertise, the distinction between competence and performance, the state of the art in Continuing Medical Education (CME) and quality improvement, and recent developments in assessment methodologies. Computerised and hands-on literature searches were performed, focused on collecting models. Three existing frameworks were transformed into a new three-dimensional pyramid: Fabb's model, a systematic approach of the domain of general practice care; Miller's pyramid, reflecting the processes of clinical reasoning and the distinction between competence and actual performance; and Donabedian's framework, including process, structure and outcome of general practice care. For logistical and complexity reasons, patient outcomes were not included in the new Pyramid Assessment Model, except for the evaluation of quality of GPs' communication with patients by standardized patients and real patients.

Three subdomains in general practice were represented on one axis: medical performance, communication with patients, and practice management. Diseases of patients, classified in chapters of the International Classification of Primary Care (ICPC) and contextual factors were represented on the second axis. The third axis represented the different assessment levels: competence, i.e. knowledge and demonstration of skills, at the basis and actual performance at the top. Using this model, tasks related to the three subdomains could be connected with different diseases and complaints of patients and their contexts, whereas a proper assessment level, i.e. a level of competence or performance, could also be selected.

This model allows test developers to define precisely their objective for testing, i.e. what should be assessed, and where and how. For each of the domains and for each level (different) assessment instruments can be chosen (see figure 1, page 16).

A practical approach in using this blueprint is presented in this first chapter. Concerning the competence level, knowledge levels were assessed by written tests and the "shows how" level, i.e. the demonstration of skills, were assessed by a standardized observation test in a simulated situa-

tion. Actual performance and practice management ("does") were assessed by video observation of regular consultations (performance) and by a practice visit to assess practice management.

Chapter 2. In this chapter issues of validity, reliability and feasibility of video assessment of actual performance of GPs are described. These focused on the following questions: how can consultations be identified and selected for a valid assessment; how reliable is video assessment considering the number of consultations and observers required; how feasible is this method concerning technical aspects, logistics, costs and acceptance by GPs and patients?

Regular consultations of 93 GPs were video recorded during one week using two cameras, one in the consulting room and the other in the examination room. The receptionist informed patients about the video recording and asked permission. The GPs registered consultation and patient data in a logbook, from which 16 consultations per GP were selected. Preset criteria based on prevalence of complaints and diseases in general practice and on a nationally accepted job description were used in the selection procedure. The quality of communicative and medical performance of these consultations was assessed by trained peer-observers with a validated scoring instrument (MAAS-global).

The validity of the procedure was evaluated by checking the content of GPs' samples of consultations using specific sample criteria. Selection bias was estimated by multiple regression analysis, with sample characteristics as independent variables and scores on communication and medical performance as dependent variables. In this way the influence of GPs' personal characteristics on scores was estimated as well. The influence of observation on GPs and patients was assessed by a questionnaire. Generalizability theory was used to estimate reliability. Feasibility was assessed by a questionnaire, by keeping accounts, and by checking the technical quality of the video taped consultations.

The domain of general practice proved to be covered well in the samples; content validity was satisfactory. As regards the sample characteristics, only the total duration of consultations appeared to correlate significantly with the scores on both communication and medical performance: the longer the total duration of the 16 consultations the higher the performance scores. A majority (71%) of GPs reported not having been influenced by the observation, except in the first cases, and recognizing their usual daily performance in the videotaped consultations. An acceptable level of reliability was reached after 2.5 hours of observation, i.e. 12 cases observed by a single observer. The method was well accepted by both GPs and patients. The costs (£ 250 per GP) were acceptable. Video assessment of GPs in daily practice, performed as described, proved both to be valid by approximating real professional life as closely as possible, and appeared reliable and feasible for use in educational and quality improvement activities.

Chapter 3 reports on the comparison between observation of GPs' performance in a multiple station examination using standardized patients and observation of real surgeries in daily practice. Consultations of 90 GPs, divided into two groups, were videotaped both in a multiple station examination at the medical school using standardized patients and in their daily practice surgery with regular patients. Peer-observers assessed GPs' communication with patients and medical

performance with a validated instrument (MAAS-Global). Both groups passed through both assessments, but in reverse order. Content validity, criterion validity, reliability, i.e. generalizability, and feasibility of both methods were compared, taking time-order effects into account.

Content validity of practice video assessment was superior to the multiple station examination, since the domain of general family practice care was better covered. Regular consultations in practice were more authentic than the simulated cases, since initial and follow-up consultations with children and older patients in the natural daily context were included. Moreover, participants judged the videotaped practice consultations as "natural", whereas hardly any GP recognized his usual working style in the multiple station examination. Concerning concurrent validity between the two test methods, only the communication component of both methods correlated. In addition, real practice performance proved to be less influenced, thus more stable, than behaviour during the station examination: scores on the multiple station examination increased significantly when the practice video assessment had been done previously (group 2), whereas practice scores appeared to be consistent, irrespective of whether GPs had passed through the station examination before or not. Reliability of both methods, expected to be better in the more controlled multiple station examination, was comparable. The organization of practice video assessment was more flexible, less costly and better accepted by GPs than the multiple station examination.

Therefore it has to be concluded that assessment for quality improvement of GPs by video observation in daily practice is superior to video assessment in a simulated situation.

Chapter 4 compares the predictive values of two written medical knowledge tests and a standardized multiple station examination for GPs' actual medical performance in daily practice.

Two groups of GPs (N=46 and N=44) were assessed using a general medical knowledge test and by a knowledge test on technical skills, followed by the multiple station examination using standardized patients and the practice video assessment of real surgeries according the study design described. In both groups the predictive value of medical knowledge tests, ranging from 0.43-0.56 (disattenuated Pearson correlation), proved to be comparable with the predictive value of the multiple station examination for actual medical performance (0.33-0.59). The overall explained variance of scores of the practice video assessment by scores on the knowledge tests was moderate (35%). GPs' professional characteristics did not contribute to the explanation of variation in performance scores.

In conclusion, medical knowledge tests can predict actual clinical performance to the same extent as a multiple station examination. Compared with a station examination, a knowledge test may be a good alternative method for assessment procedures of a large number of practising GPs, since knowledge tests can be used on a broad scale with relatively low resource investments. In addition, these tests have a far better predictive value for actual performance than GPs' personal characteristics, such as age, gender, College membership or working single-handedly.

Chapter 5 describes the relationship between practice management (structure) and actual clinical performance (process) in general practice. The precise relationship between these dimensions is tenuous. Analysis of their mutual relationship may yield insight into the way they contribute to

outcome. A study is described in which the practice management of 93 GPs was assessed by a practice visit performed by a non-physician observer using a validated instrument (VIP), directly after the GPs had been videotaped in their daily surgeries.

Pearson correlations (observed and disattenuated for unreliability of the instruments) between scores on 22 practice management dimensions and scores of 16 selected cases on medical performance and communication were calculated. The predictive value of specific practice management aspects for actual performance was determined by multiple regression analysis.

Nine practice management dimensions proved to correlate significantly with medical performance and so did five dimensions with actual communication. Overall, most associations were weak.

Combined with demographic variables (age for medical performance and working single-handedly for communication), 26 percent of variance in medical performance scores and 11 percent of variance in scores of communication with patients could be explained by only five practice management dimensions. Organization of quality assessment activities, i.e. assessment with the help of data from the medical insurance, prescriptions, referrals and diagnostics, explained most of the variation in medical performance (ten percent). Two practice dimensions, i.e. delegation of medical tasks to the practice assistant and working single-handedly, explained six respectively five percent of variance in communication with patients scores.

In conclusion, practice management (structure) and actual performance (process) seem largely independent constructs. However, some practice management dimensions might be linked up with GPs' performance. In all, quality improvement and assessment activities should emphasize that practice management is different from actual performance. Structure and process may contribute to patient outcome independently from each other.

Chapter 6 contains an explorative study concerning observation of GPs' communication with patients assessed by peers, real patients and standardized patients (SPs), focused on the question whether such assessments of GPs provide relevant additional information about GPs' communicative performance, from both the professional perspective and patients' perspective.

Two groups of 43 GPs each went through the "Multiple Station Examination" using SPs and through the "Practice Assessment" in regular surgeries, following the study design described before (see page 16). GPs' communicative performance was evaluated by peers with the MAAS-Global, and by SPs and real patients with an instrument derived from the MAAS-Global.

The correlation between the scores given by standardized patients, scores given by real patients and scores given by peer-observers was assessed. Results showed that SPs were to some extent consistent with peers in the simulated situation. Second, both real patients and SPs valued GPs' quality of communicative performance more positively than peers. Third, real patients probably differ from both SPs and peers in evaluating the quality of GPs' communication substantially, since no correlation was found between patients' scores and SPs' scores or peers' scores.

Finally, the quality of GPs' communication with SPs in a simulated situation may differ from the quality of GPs' actual communication with real patients in daily practice. This aspect has been analysed in detail in Chapter 3.

It has been hypothesized that SPs' evaluation of GPs' communicative performance was comparable with the observation "at distance" by peers, since they evaluated as uninvolved healthy persons about hundred GPs in a short and independent relationship with the observed GP. Real patients, on the other hand, are more involved in the lasting relationship with their GP. Moreover, real patients may be focused on the GP's final conclusion, i.e. bad or good news, concerning their serious complaints and therefore they may be less interested in the communication process. Being consumers, they seem to have an other perspective on GPs' communication with patients than professionals.

From the educational perspective, peer observation or evaluation by standardized patients combined with the evaluation by real patients may provide relevant information about GPs' communication with patients. SPs represent patients' perspective by giving high absolute scores as well as the professional perspective by being consistent with peers. Evaluation by real patients is important, since they represent consumers' needs. On the other hand, the low scores given by peers may be an effective stimulus for GPs to improve their communicative performance.

Finally, within the scoringlists used, absolute high scores might be relatively low, which is useful for the selection of topics for quality improvement.

Therefore, both not-involved observers (peers and SPs) and involved real patients should be used in evaluating GPs' communication with patients.

Chapter 7 contains the general discussion and recommendations for research, and describes GPs' evaluation of the assessment procedure. The overall conclusion of the study is that a valid and reliable comprehensive assessment of individual practising GPs should include both an assessment method for direct (video) observation of GPs' communicative and medical performance in daily practice and a method for practice visitation to assess GP's practice management. Concerning the pyramid assessment model, it is argued that further study should be performed in order to include GPs' attitude and patient outcomes in a model for assessment. Clinical tasks to be assessed should be formulated before the implementation of a procedure for comprehensive assessment, since the model is global. In relation to video assessment in daily practice, the area of tension between standardization of samples of regular consultations, content validity and reliability needs further research. Strict standardization may decrease content validity, since each sample has to be representative for the working style of each GP. Assessment in a simulated situation may be useful in specific CME activities focused on specific skills. For screening purposes on a broad scale this method is costly, not well accepted by GPs and therefore less useful than video assessment in daily practice.

Moreover, less costly medical knowledge tests predict actual clinical performance to the same extent as a multiple station examination and are therefore a good alternative method. Since these tests have a far better predictive value for actual performance than GPs' personal characteristics, such as age, gender, College membership or working single-handedly, it is concluded that these tests should be developed for the assessment of GPs' communication with patients and practice management as well. Concerning practice management, it is argued that this aspect of general

practice care has a low predictive value for actual performance. Structure and process may contribute to patient outcomes independently from each other, which needs further research. Finally, with regard to patients' evaluation of GPs' communicative performance, real patients being consumers may have another perspective than peers or standardized patients. Real patients' satisfaction with GPs' communicative performance, which may be considered as patient outcome, showed no relationship with peers' scores of this communicative process. This finding requires further research as well.

The participation in the comprehensive assessment including the feedback given was evaluated by the GPs using a questionnaire. Peer-observers and GPs of the control group were sent a questionnaire as well. In this study feedback was given in a limited extent in order to minimize a possible order effects, which would bias the relationship between methods used. The questionnaire contained four main questions concerning the following aspects: the profit of participation in the assessment versus its efforts (1), the effects on GPs' insight in their way of functioning (2), GPs' plans for concrete changes in daily practice care (3) and GPs' activities on medical education as a result of participation (4). GPs and peer observers viewed a positive balance between profit and effort of participation. GPs of the control group, who participated on the knowledge tests only, viewed the balance as less positive than observers and assessed GPs. Observers and assessed participants viewed both the medical knowledge test, the assessment of practice management, the multiple station examination and the practice video assessment as methods which gave them insight in their way of functioning, the latter two for communication aspects particularly. However, a majority made no plans for concrete changes, whereas a minority performed individual educational activities mainly, i.e. self directed learning and immediate changes in performance or practice management.

GPs' preference for assessment methods to be included in a comprehensive procedure favoured the video-assessment in daily practice (medical and communicative performance) combined with the assessment of practice management by visitation and a written medical knowledge test.

A majority of GPs preferred a combination of written and oral feedback and showed a slight preference for an unknown colleague, provided that a GP would be the mediator.

In this study, the "quality circle" correctly started in practice observation and collecting data from practice. However, the next stages of this circle, i.e. the evaluation of information (performance versus targets) including setting priorities in implementing changes, the agreement of criteria including setting target standards and a subsequent observation of practice to evaluate changes, have not been performed, since this methodological study was focused on the relationship between methods used. In relation to these limitations, the educational effects of the study on the participants are encouraging. Further research on feedback as a part of continuous quality improvement activities is necessary, in order to make assessment activities including feedback as effective as possible.

MAAS-GLOBAL SCORING LIST FOR GENERAL PRACTITIONERS AND GP-TRAINEES

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April 1995

doctor: name

registration number

case

patient

observer

0 = not present 2 = unsatisfactory

4 = satisfactory

6 = excellent

1 = poor 3 = doubtful

5 = good

n.a. = not applicable

The rating boxes are intended only as a reminder for the observer.

Circle the relevant score for each item.

COMMUNICATION SKILLS DURING EACH PHASE

1. OPENING	0 1 2 3 4 5 6
greeting: attention and inviting	☐
name and function where necessary	☐
turning to reasons for the visit	☐
asking about other reasons for the visit	
(after asking about main reasons and before history taking)	☐
2. FOLLOW-UP CONSULTATION	n.a. 0 1 2 3 4 5 6
referring to complaints and requests for help	☐
referring to agreements made and checking up	
on implementation	☐
asking about how things have been	☐
3. CLARIFICATION	0 1 2 3 4 5 6
naming/clarifying requests for help, wishes	
or expectations	☐
naming/clarifying reasons for present visit	☐
continuing to ask questions in the patient's frame of	
reference and investigating cues only with respect to	
clarifying questions	☐
4. PHYSICAL EXAMINATION	n.a. 0 1 2 3 4 5 6
instructing the patient	☐
informing about the examination	☐
treating the patient with care and respect	☐
5. EVALUATION AND DIAGNOSIS	0 1 2 3 4 5 6
naming findings and diagnosis/hypothesis	☐
naming causes or the link between findings and diagnosis	☐
naming prognosis or course of events to be expected	☐
6. TREATMENT AND APPOINTMENTS	0 1 2 3 4 5 6
consulting about treatment plan	☐
discussing the feasibility and the behaviour to be	
complied with	☐
making appointments: who, what, when	☐
7. EVALUATING THE CONSULTATION	0 1 2 3 4 5 6
general question	☐
answering requests for help	☐
provisional/interim outlook	☐

GENERAL COMMUNICATION SKILLS

8. CONVEYING INFORMATION		0 1 2 3 4 5 6
announcing, categorizing	☐	
in small quantities, concrete explanations	☐	
comprehensible use of language	☐	
asking about reactions and whether patient understands	☐	
9. EMOTIONS		0 1 2 3 4 5 6
asking or continuing to ask about feelings	☐	
reflecting feelings (including nature and intensity)	☐	
sufficiently throughout the whole consultation	☐	
coping reactions: first going into feelings	☐	
10. SUMMARIZING (both summarizing and repeating)		0 1 2 3 4 5 6
briefly, in own words	☐	
correct regarding content, complete	☐	
checking	☐	
sufficiently throughout the whole consultation	☐	
11. ORDER OF INFORMATION		0 1 2 3 4 5 6
logical order of the phases	☐	
balanced division of time	☐	
announcing (consultation plan, history taking, examination, other phases)	☐	
12. FLEXIBILITY		0 1 2 3 4 5 6
empathizing, attentive and open in intonation, gesture and eye contact	☐	
adequate time/space for the patient	☐	
no disrupting hitches or interruptions	☐	

MEDICAL ASPECTS

Where necessary, rate as best as you can. Consult if available
National GP standards, guidelines, protocols or
special observer instructions.

HISTORY TAKING		0 1 2 3 4 5 6
EXAMINATION	n.a	0 1 2 3 4 5 6
EVALUATION AND DIAGNOSIS		0 1 2 3 4 5 6
TREATMENT AND APPOINTMENTS		0 1 2 3 4 5 6

OTHER FEEDBACK

CURRICULUM VITAE

Paulus Maria Ram was born on the twelfth of July 1948 in Arnhem, the Netherlands. In 1966 he finished his gymnasium after which he studied medicine at the University of Nijmegen. He graduated in 1975. From 1977 till 1985 he set up and coordinated a health centre in Oss, the Netherlands, where he worked as a general practitioner untill 1994. He combined this job with education in medical health professions and presented medical education courses on radio and television ("Dag Dokter" by Teleac) from 1983 untill 1988. In 1985 he became tutor in vocational training at the Department of General Practice at the University of Maastricht. Since the end of 1993 he worked as a researcher on the Comprehensive Assessment Project (CAP), initiated and supported by the Centre for Quality of Care Research (WOK) and by the Department of Medical Education of the University of Maastricht, which finally has resulted in this thesis.

He was adviser of the comprehensive assessment of GP-trainers at the University of Nijmegen. At the end of 1997 he finished to be a practising general practitioner and started as a part-time member of staff at the Dutch College for General Practitioners (NHG) in Utrecht, working on the implementation of comprehensive assessment methods in quality improvement activities in general practice. In 1998 he continued his career as adjunct-director at the vocational training section of the Department of General Practice at the University of Maastricht, combining management tasks with teaching the teachers.