Quality of health care surveillance systems: review and implementation in the Swiss setting

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Summary

Quality of health care has been a subject of attention for many years in the USA and in Europe. Since the introduction of the new federal law on insurance in 1996 it has evolved to a progressively more important issue within the Swiss health care system. In this review, some theoretical concepts of quality of health care, variations, and surveillance systems are explored. Examples of quality of health care surveillance systems that have been developed successfully in the USA, in Canada, in Australia, and in Europe are discussed. They all demonstrate the interest in creating a large range of quality indicators in the surveillance system and in evaluating hospital performance using a benchmark approach. Currently, the measurement of quality with appropriate indicators is a subject of intense debate between the Swiss Hospitals Association (H+) and the Swiss Health Insurance Consortium (Santésuisse). Examples of existing surveillance systems in Switzerland are the Outcome Verein in Zurich and the quality of care program of the Canton of Valais. The FoQual association has also contributed to the debate by reviewing six indicators, which could be used nationally for a healthcare surveillance system. In this debate it is important to stress that ideal quality indicators intended for use as measures of quality in Swiss hospitals need to be both appropriate and valid. Only indicators that fulfil these conditions should be integrated in a Swiss health care surveillance system. Priority needs to be given to quality indicators and methods with the highest level of evidence and with a solid scientific basis.

Introduction

Since more than 20 years, quality has been a topic of interest in health care, which has increased for several reasons. The most important factor is the variation in care outcomes that cannot be explained by differences in patient characteristics, first described in detail by Wennberg and colleagues [1]. A second reason is the growth of costs and the rising utilisation of health care services. These concerns have spurred interest in quality and quality improvement as a means of controlling growth and improving service.

In this review we will first address some basic concepts in quality of health care, including definitions and measurement. We will describe how and why variations in care can occur, and go on to describe the tools used to measure quality of health care, including surveillance systems. Several models (and activities), both international and Swiss, will be presented. Finally, we will discuss the implementation of surveillance systems in the Swiss setting with examples from the Outcome Verein in Zürich [2], the indicators reviewed by the FoQual association [3], and the more detailed description of the current quality of care program of the canton of Valais. These Swiss examples are presented in the light of the intense debate currently taking place between the Swiss Hospitals Association (H+) and the Swiss Health Insurance Consortium (Santésuisse) on which quality indicators are appropriate for use in the measurement of hospital performance.

Key words: quality of health care; surveillance systems; Swiss health care setting

Quality of health care

In 1980, Donabedian defined high quality care as "that kind of care which is expected to maximise an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts" [4]. One of the most widely cited recent def-

initions, formulated by the Institute of Medicine in 1990, holds that quality consists of the "degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" [5].

Measuring quality of care has traditionally relied on the structure-process-outcome framework developed by Donabedian [4]. Structural factors are the characteristics of health care professionals and hospitals. They include the tools and resources available to providers as well as their physical and organisational setting. Structure embraces the human, physical and financial resources that are needed to provide medical care. For Donabedian good structure includes, for example, sufficient resources and proper system design as key points to ensure good quality of care. Process data are the components of the encounter between a physician or other health care professional and a patient (e.g. tests, medications ordered or information shared with the patient). Acceptable or good processes are the characteristics of use of services relative to need, for example, appropriateness of diagnostic procedures and treatments or adherence to professionally defined norms of good practice, such as evidence-based clinical guidelines. Processes also include the way providers deal with patients in terms of concern, courtesy, respect and time spent with the patient. Outcome refers to the change in the patient's current and future health status that can be attributed to antecedent health care. Typical examples of outcome data are in-hospital mortality rate, readmission rate, functional status, quality of life, patient satisfaction and costs. In defining these terms Donabedian made the distinction between client-related outcomes and practitioner-related outcomes. He argued that provider satisfaction in addition to patient satisfaction is an important measure of system effectiveness.

The traditional structure-process-outcome model described by Donabedian in order to demonstrate how to measure the quality of care with indicators as well as quality of care services system is only one part of the quality improvement circles. These circles are often defined in terms of Plan, Do, Check, Act cycles. The Check part is related to quality indicators and the Act part to the continuous quality improvement initiatives. These are structured organisational improvement initiatives within healthcare systems aimed at providing better care that meets customer expectations. From these quality circles, models have also been developed, such as total quality management (TQM) and European foundation for quality management (EFQM).

Health surveillance systems need to be conducted using valid and reliable quality indicators. Good indicators should be linked to and predict directly the quality of health care, as for example nosocomial infections. On the other hand readmissions for complications are poor indicators, because they are only indirectly related to the quality of care. To be valid indicators they need to measure what they were intended to measure. Finally, indicators should also be reliable. Repeated measurements of a stable phenomenon, by different people and instruments, at different times and places, should yield similar results.

Variations in care

Over the past few decades the importance of the variation phenomenon in modern medicine has been shown. In particular, differences are observed in the way apparently similar patients are treated in one hospital compared to another [6]. John Wennberg is a pioneer in this field and his findings on small area variations represent very important steps in health services research. In a famous paper he was the first to demonstrate the large variation in resource input, utilisation of services, and expenditure between two similar communities in Vermont [7]. He went on to demonstrate large variations of hospital use and expenditure for inpatient use between Medicare beneficiaries in two US towns (Boston and New Haven). These findings had an impact on the attention given to outcome and the cost implications of differences in practice styles [1]. In a further study comparing the same areas he showed that patients in Boston have higher rates of discharge, readmission, length of stay, and reimbursement compared to patients in New Haven [8].

Different explanations exist for these variations. Some have argued that each physician has an individually unique knowledge on how to diagnose and treat patients. Another explanation might be that variations in health care are due to the availability of supply in health care resources [9]. Another argument is related to practice volume [10]. Some authors argue for the "enthusiasm hypothesis". This reflects the idea that key personalities locally influence physicians in an area on how to treat patients [11]. Another argument stresses that variations in the use of health services were due to inappropriate care [12]. Variations in health care management and delivery have also been demonstrated previously in cardiology in the use of cardiac procedures after acute myocardial infarction [13–17], in the use of coronary artery bypass surgery [18–21], and in the treatment of patients with congestive heart failure [22, 23].

Table 1

Quality of Health Care Surveillance in the Canton of Valais: existing data and action plan for the next five years.

Indicators	quality of healthcare program, Canton of Valais, Switzerland				
	surveillance of the quality indicators			quality improvement initiatives*	
	already existing	proposed for the next 5 years	automatic extraction to the data-warehouse	already existing	proposed for the next 5 years
1. Structure indicators					
Number of stays, operating rooms, or other indicators derived from administrative data	+	+	+	+	+
2. Process indicators					
Evaluation of the quality of coding	+	+	–	+	+
Use of broad spectrum antibiotics	+	+	+	+	+
Vaccination coverage of the staff, for hepatitis B and influenza	+	+	–	+	+
Surveillance of drug prescription	+	+	+	+	+
Audit of the anaesthesiology ward	–	+	+	–	+
Treatment and management of congestive heart failure	–	+	+	–	+
Treatment and management of acute myocardial infarction	–	+	+	–	+
Treatment and management of community acquired pneumonia	–	+	+	–	+
Nursing data	+	+	+	+	+
3. Outcome indicators					
Routine indicators from administrative data, such as mortality in-hospital, unplanned readmissions, length of stay	+	+	+	–	+
Review of hospitalisations	+	+	–	–	–
Chart review for unplanned readmissions	+	+	–	+	+
Surgical site infections	+	+	–	+	+
Prevalence of nosocomial infections	+	+	–	+	+
Surveillance of bacteraemia	+	+	–	+	+
Patient satisfaction	+	+	–	+	+
Staff satisfaction	–	+	–	–	+
Patient security (incident register)	–	+	–	–	+

* These include feedback, dissemination of evidence-based clinical guidelines, use of reminders, or opinion leaders

Outcome Variations

Outcome is defined by Donabedian as "a change in the patient's current and future health status that can be attributed to antecedent health care" [4]. The outcome movement has flourished in the US in the last two decades with an enormous growth of activities such as the assessment of outcomes, the analysis of effectiveness and quality assurance [24]. Many factors have promoted and triggered this movement in the US. One factor is the increase of health care costs and the need for cost containment. In this situation outcome measures are necessary to detect deterioration in quality. Other factors are increased competition and the answers needed to explain John Wennberg's research findings on small area variations [1, 7, 8]. In particular, differences in the hospital-to-hospital management of patients with different diseases have been described. The persistence of differences in outcomes after controlling for case-mix factors leads to the argument that other factors such as process of care or structural factors must influence outcomes.

Variations in outcomes have been demonstrated in many studies, especially in the US. In particular hospital mortality has been shown to vary across hospitals [25, 26]. Other studies found that variations in hospital mortality for surgical patients were due to the volume of these specific surgical procedures performed in the hospital [27, 28]. The interpretation of the results of these and many similar studies is controversial. One group argued that meaningful comparison of hospital death rates requires adjustment for severity of illness [29]. This group also insisted that new methods need to be found to target lower quality hospitals when using mortality as a quality indicator. These new methods need to ensure that high death rates are not due to random variations. Secondly, the quality of care in selected hospitals should also be compared using medical records data. Thirdly, comparison should include both implicit (outcomes) and explicit (structure and process measures) assessment of the quality of care. Fourthly, the evaluation should be public and accepted by professionals. Finally, detailed data on severity of illness and comorbidity should be collected to ensure a proper case-mix control [30].

Surveillance systems and quality assurance

Public health surveillance is the ongoing systematic collection, analysis and interpretation of health data, closely integrated with the rapid dissemination of health data both to those providing the data and to those who can apply the data to control and prevention programs [31]. Appreciation is growing that public health surveillance systems can be adapted for use in programs to improve the quality of care delivered to patients. This depends on the active participation of individual clinicians and hospitals in the assessment and improvement of the quality of medical care.

Examples of hospital-wide surveillance activities include quality assurance programs conducted in the US by the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) and Medicare. JCAHO developed standards on how to monitor and evaluate processes and on how to implement a surveillance system for processes in a hospital.

Monitoring and evaluation must be undertaken hospital-wide, including both medical staff functions and hospital service functions. Areas that might benefit from monitoring and evaluation include each medical staff department or clinical service, surgical procedure case review, drug and blood products usage, pharmacy and therapeutics function, infection control and safety. In each organisational unit, the staff must consider the care they provide and the procedures they perform and identify the most important aspects of that care, which because of higher risk, or the greater volume, are the most prone to problems. Consideration should be given to the appropriateness of care and if that care is performed properly [32].

In the US, more than 10 years ago the Healthcare and Financing Administration (HCFA) started to implement a programme to measure and track the quality of care for Medicare beneficiaries [33]. HCFA implemented surveillance systems including 24 initial measures, which include quality indicators for heart failure, acute myocardial infarction, pneumonia, stroke, breast cancer and diabetes. Performance on these quality indicators has been reported state wise [34]. A similar approach is now used by the Joint Commission on Accreditation of Healthcare Organisations (JCAHO), who launched the ORYX initiative to establish a continuous, data-driven accreditation process through the incorporation of performance measurement data. These initiatives allow a continuous, data-driven accreditation process for hospitals, providing then an additional tool to be used in their internal quality improvement efforts and allowing comparative evaluations between hospitals. These surveillance systems include performance measures for heart failure, acute myocardial infarction, pneumonia, some surgical procedures and complications, and some pregnancy related conditions. The ORYX score measures for acute myocardial infarction, heart failure and pneumonia are derived from the HCFA quality indicators [35].

Other examples of quality of care surveillance systems have been developed in countries outside the US. For example in Ontario, Canada, quality indicators have been developed to compare hospitals regarding quality of care for the following ten conditions: acute myocardial infarction, heart failure, stroke, pneumonia, asthma, gastrointestinal haemorrhage, cholecystectomy, hysterectomy, prostatectomy, and carpal tunnel release surgery [36]. For these conditions, selected outcomes, such as complications, length of stay, readmission and access to technology are measured. With this surveillance system one can monitor quality of care in each hospital in the province of Ontario. The Australian Council on Health Care standards has also developed a similar surveillance system using clinical indicators to monitor the quality of hospital care. Australia has also been a leader in developing quality indicators for health care organisations. In 1999, 191 quality indicators were used for almost all medical specialities. The goal of this surveillance system was to demonstrate to hospitals how they compared to other health care organisations and if they had a potential to improve the quality of health care. Before benchmarking between institutions several limitations need to be taken into account including controlling for case-mix, for the size and for the goal of the hospital (teaching, non teaching). In these systems the Australian Council on Healthcare Standards has divided their quality indicators by medical categories such as adverse drug reactions, anaesthetics, day procedures, intensive care, emergency medicine, internal medicine, psychiatry, etc. One indicator use in the emergency medicine branch is for example, "thrombolysis initiated within 1 hour of presentation for acute myocardial infarction" [37]. In the UK, the National Health Service has developed a performance-rating system which includes structure and process measures covering many aspects of hospital activities, such as waiting list, waiting time, operation cancelled, hospital cleanliness, satisfactory financial position, etc. Several performance measures are also used with clinical, staff and patient oriented indicators. Clinical focused measures include death in hospital within 30 days of surgery, emergency readmission rates and clinical negligence. Patient focused indicators are related to waiting time and staff focused on qualification and absence rates [38]. Similar approaches using a surveillance system with quality indictor measures have also been used in France, where performance measure have been developed in many clinical areas [39, 40].

Quality of care for congestive heart failure (CHF), an example of a surveillance scheme

In the United States more than 4 million people currently suffer from congestive heart failure (CHF) (1.6% of the general population), and approximately 400 000 new cases are diagnosed each year. Mortality is high with 6-year mortality rates of 80% in men and 65% in women [41]. As the population ages the crude incidence of heart failure and its mortality rate will continue to increase. According to the Health Care Finance Organization (HCFA), the in-hospital mortality rate for Medicare patients with CHF was 7% in 1992. In two older studies, the 30-day mortality rates were about 15% for CHF among Medicare patients [42, 43]. In the United Kingdom the prevalence of CHF among the general population is estimated to be between 0.4% and 1.5% and 5% of all adult hospital admissions are due to heart failure [44]. In Switzerland about 210 000 people have CHF, of which 68% are treated and 47% have received angiotensin-converting enzyme inhibitors (ACEI) [45].

Measurement of Process Indicators

In the United States, both the Agency for Health Care Policy and Research (AHCPR) and the American College of Cardiology (ACC) have published guidelines related to the diagnosis and management of patients with congestive heart failure [46]. Recently, the Advisory Council To Improve Outcomes Nationwide in Heart Failure (ACTION HF) has also published an update of these guidelines [47]. In Europe, similar evidence-based clinical guidelines have also been published [48].

Congestive heart failure exemplifies a disease with high morbidity, mortality and high cost. Most of the time CHF occurs in elderly patients, who have high readmission and mortality rate. In addition internationally recognised evidence-based guidelines exist for the management and treatment of patients with CHF. In particular, all patients hospitalised with CHF, not previously investigated, should undergo an investigation to assess their ejection fraction and to determine if their ventricular dysfunction is predominantly systolic or diastolic. All patients with left ventricular systolic dysfunction should receive angiotensin converting enzyme inhibitors at target dose.

Poor process has negative impacts on health outcomes. Kahn et al. showed that patients hospitalised with CHF, who received poor quality care, defined by explicit process criteria had increased 30 days post hospital discharge death rates [49]. A study conducted in five US states with Medicare beneficiaries admitted with a diagnosis of CHF as part of the Health Care Quality Improvement Program from the Health Care and Financing Administration (HCFA). The results showed that patients who received target dose ACEI had a better survival compared to patients who had less than target dose ACEI or no ACEI [50].

Quality of care initiatives in Switzerland

Whereas in the USA quality of care research and clinical evaluation have been steadily developing over the past 20 years, there was no large interest in Switzerland until recently. Increasing health care costs have stimulated the demand for a more systematic evaluation of the health care system and allowed research on quality of care to be developed. The new federal law on universal medical insurance requires that "scientific and systematic measures to guarantee the quality and the appropriateness of care …" should be implemented. A survey conducted in 1994 among clinical department heads at Swiss university hospitals inquiring about quality assurance activities indicated that assessment of quality could be improved. For example, only 67% of the respondents knew the department mortality rate and only 33% knew the department adverse treatment effects rate [51].

Quality of care initiatives have been progressively developed in many clinical care settings. In addition, modern development in quality of care monitoring and improvement in industry and serv-

ices (including public services) has been associated with the growing offer of various training programmes in quality. Some collaborators of health care institutions have made use of such opportunities. Moreover, multiple short courses and seminars have been offered to executives, managers and staff of health care services. Large hospitals as well as smaller entities have created positions for quality specialists. Consultants and associations, with various degrees of skills, resources and know-how, have offered their services to hospitals and health care institutions. Accreditation, certification [52] and total quality management programs have been started.

The Swiss Medical Association is working on developing or implementing various projects to ensure or improve quality of care. A task force is currently elaborating a policy for the formulation of multidisciplinary national guidelines to be developed jointly with the specialty societies involved in a specific medical condition. Various options have been used to measure quality of care.

Health service research is also an area of interest in Switzerland. In particular several studies have been implemented to assess the appropriateness of medical care [53]. One study examined the appropriateness of indications for surgery of lumbar disc hernia and spinal stenosis in patients undergoing surgery in two university hospitals. The criteria used to assess appropriateness of indications were formulated using the method developed by the Rand Corporation [54]. In that study the criteria, established by an American panel, identified a large percentage (38%) of inappropriate procedures [55]. Another study tested the appropriateness of referrals for upper gastrointestinal endoscopy in an open access endoscopy unit using the criteria of the American Society for Gastrointestinal Endoscopy, here only 57% of the indications were judged appropriate [56]. A larger study was then conducted using explicit Swiss criteria developed by the RAND-UCLA panel method. The results showed that 49% of these procedures were inappropriate and that overuse of upper gastrointestinal endoscopy occurred in 5.1% of patients who presented with upper gastrointestinal symptoms [57]. The same set of patients was also used to assess under-use of upper gastrointestinal endoscopy, which was shown to be substantial [58]. In the same context of gastrointestinal endoscopy, the agreement between American and Swiss appropriateness criteria was shown to be large [59, 60]. Besides the research projects, the group has tried to disseminate appropriateness methods and quality assurance concepts in the local medical community [61–63].

Few studies on small area variations in health care utilisation have been conducted in Switzerland. One study found large geographical variations in coronary arteriography rates in Switzerland [64]. Another study looked at regional variations in the rate of operations for hip fractures in the Canton of Vaud [65].

Existing quality of health care surveillance initiative in Switzerland

As in the US, quality of care in Switzerland is not optimal in many health care settings, in particular for the management and treatment of patients with congestive heart failure. As in the US, variations in treatment of patients with CHF by physicians and institutions exist. To reduce variations, evidence-based clinical practice guidelines have been developed in the US, and to a less extent in Switzerland. HCFA has developed a surveillance system for CHF patients using valid and reliable quality indicators derived from evidence-based guidelines. This strategy will also be developed in Switzerland in the near future. Currently the Swiss Hospitals association is debating with the Swiss Health Insurance Consortium on what type of quality indicators should be used in Switzerland to monitor hospitals. In this debate, it is important to stress that only appropriate and valid indicators should be used for healthcare surveillance systems. It is not easy to know which indicators are best suited for general use in a Swiss setting. The framework developed by the association FoQual aimed at answering this question. For six indicators they described in detail: representativeness, possibilities for general use, validity and reliability of the performance measure, case-mix, interpretability, application, research and development, costs and recommendations. Each of these questions needs to be asked for each and every indicator that might be developed and employed [3].

A few quality of health care surveillance systems have already been developed in Switzerland. In particular, in 1995 the Ministry of Health of the canton of Zürich started a performance-oriented resource allocation project. Several instruments for the measurement of outcomes in acute hospitals were defined and tested. This project resulted in the development of 10 tracer diagnoses and 12 global indicators, which are now used on a mandatory base in all the hospitals in the canton of Zürich [66, 67]. The indicators developed by this project include waiting time, delays and postponement of interventions, as well as patient satisfaction measures. For each tracer diagnosis, several quality indicators have been developed. The main tracer diagnoses include appendicitis, acute myocardial infarction, stroke, birth and prostatic hyperplasia [2]. Similar developments will soon take place in several other Swiss cantons.

The association FoQual was recently created in the French and Italian speaking parts of the country and includes researcher and quality specialists from several cantons. In a first step, using a rigorous scientific approach this group described six quality indicators including: quality of coding, patient satisfaction, nosocomial infections, pressure ulcer, readmissions, and treatment for acute myocardial infarction. The FoQual association currently recommend introducing four measures (quality of coding, patient satisfaction, nosocomial infections and pressure ulcer) as sufficient evidence exists on these quality of care measures. However the same group stress the importance of not using crude readmissions to compare hospitals, even when controlling for the case-mix. Further research needs to be done on these indicators, especially on how to ascertain planned readmissions. The association also recommend that measures to evaluate the management and treatment of acute myocardial infarction should not be introduced until better control for all potential diseases is achieved. This group is planning to publish new

recommendations in the future, including further indicators for monitoring medical errors and related to the use of hospital administrative data such as mortality and readmissions [3]. The purpose of the FoQual association was not primarily to develop a surveillance system, but to give recommendations on possible quality indicators in the Swiss healthcare debate, especially on which indicators are appropriate and valid.

Besides this national effort, a surveillance system, which includes quality indicators to monitor hospitals will be developed in the near future by the "Réseau Santé Valais" in collaboration with the Health Observatory in the canton of Valais. The first step of this surveillance system will be the development of quality indicators that allow evaluation and monitoring of different aspects of quality of care in hospitals. A further step will consist of quality improvement initiatives, such as feedback, development and dissemination of evidence-based clinical guidelines, use of reminders, or opinion leaders. This initiative constitutes a pilot project.

In the next two or three years, electronic medical records will be installed in each hospital in the canton of Valais, allowing predefined data to be automatically extracted to a centralised data warehouse. By using this system, it will be possible to collect data for epidemiological research, surveillance, and for quality of healthcare monitoring. This will eliminate the need for manual extraction for research projects [68].

Table 1 summarises those quality indicators, which already exist, and those, which will be used for quality of healthcare surveillance in the canton of Valais during the next five years. These quality indicators are categorised into structure, process and outcome indicators. Structure indicators are primarily gathered through administrative data, such as the number of beds, counts of hospital stays, or the

number of operating rooms. Several process indicators have already been collected through the Hospital Epidemiology Unit of the Central Institute of the Valais Hospitals (CIVH), such as the use of broad-spectrum antibiotics [69] and vaccination coverage of the staff for hepatitis B and influenza. The quality of diagnostic and intervention codes from administrative data (ICD-10 codes) has been evaluated in 1998 [70]. A new study will assess the accuracy of these codes for the 2000 data. It is planned to repeat this evaluation of quality of coding every other year.

Other process indicators will be introduced in the canton of Valais for surveillance of the quality of healthcare. These process indicators are related to the treatment and management of congestive heart failure, acute myocardial infarction, and community acquired pneumonia. These diseases were chosen because of their high mortality, high morbidity and high costs, and also because clinical practice guidelines exist for the management and treatment of these conditions [41, 46, 47, 71–74]. Guidelines are known to have a positive effect on quality. Although changing physician's behaviour is not an easy task, successful implementation of guidelines has been demonstrated in the Swiss setting [75].

Several outcome indicators will be directly collected from administrative data, such as in-hospital mortality, readmission, length of stay and complications. Besides these indicators, several outcome indicators such as surgical site infections [76], prevalence of nosocomial infections [77], surveillance of bacteraemia and chart review for unplanned readmissions have already been collected through the Hospital Epidemiology Unit of the CIVH. This will be repeated in the future. Other outcome indicators will be added to the surveillance system, such as patient satisfaction, staff satisfaction and patient security.

Conclusions

Quality of care has been shown to be not always optimal in many settings, including the Swiss healthcare system. Precipitated by the introduction of a new law on medical insurance, a debate has emerged between the Swiss Hospital Association (H+) and the Swiss Health Insurance Consortium (Santésuisse) on the choice of quality indicators to monitor Swiss hospitals. It is important to choose appropriate indicators. These indicators need to be valid and reliable, but also readily applicable and available for general use. In particular they need to integrate a method to control for casemix. These quality indicators are only one part of a quality improvement circle. Other parts concentrate largely on quality improvement initiatives

and are therefore also important in improving the quality of the healthcare system. These parts include quality improvement approaches, evidence-base clinical guidelines and methods to change physician's behaviour.

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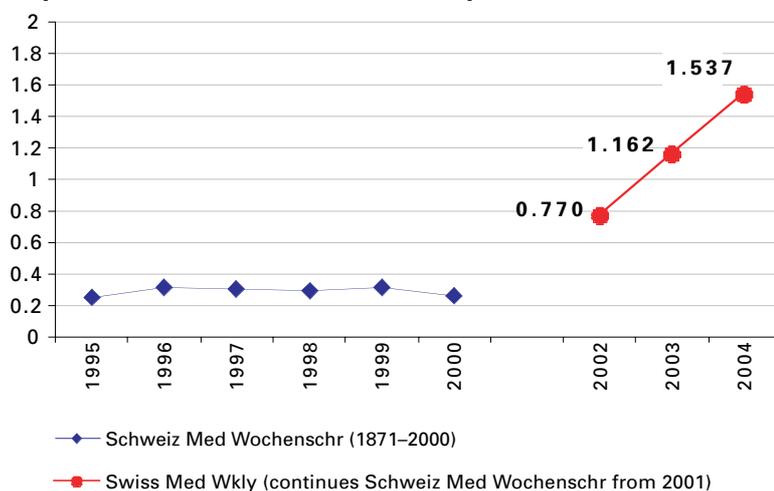- No page charges and attractive colour offprints at no extra cost

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