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Public reporting about healthcare users' experiences

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Public reporting about healthcare users' experiences: the Consumer Quality Index

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Public reporting about healthcare users' experiences: the Consumer Quality Index

Keuze-informatie over de ervaringen van zorggebruikers: de Consumer Quality Index

PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit van Tilburg,
op gezag van de rector magnificus, prof. dr. Ph. Eijlander,
in het openbaar te verdedigen ten overstaan van een door het college voor
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door

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Contents

1

General introduction

Healthcare users[1] are increasingly seen as involved information managers in the healthcare system. They are expected to actively navigate through the healthcare market and make well-informed decisions about treatments, healthcare providers and their own health management. It reflects a liberal trend in policymaking with a strong emphasis on individual responsibility, autonomy and self-determination (Maarse and Ter Meulen, 2006; Pratt et al., 2006). The publication of health information is central in this process: without information, no 'informed healthcare users' (Ministry VWS 2001a; Williamson, 2008). Within the great variety of available health information, one type is relatively new in the Netherlands: *comparative healthcare information*. The introduction of healthcare market reforms has been the main driver of the publication of this information. The information, consisting of *public reports about healthcare providers or health plans and their performance*, has not received much attention yet, at least not from the perspective of Dutch healthcare users.

Different types of comparative healthcare information have been published worldwide, such as information about waiting times, general provider characteristics and healthcare quality (Lugtenberg and Westert, 2008). Healthcare quality can be measured by different indicators and from different perspectives, such as the perspective of healthcare professionals and the perspective of healthcare users. For that reason, comparative healthcare information is usually drawn from various sources, including existing clinical and administrative records and healthcare users' own assessments through surveys (Zaslavsky, 2001; Brien, Dixon, and Ghali, 2009; Delnoij, 2009).

This thesis addresses the issue of how comparative healthcare information, and more specifically *consumer assessment data* (healthcare users' own quality assessments), should be adapted and presented to healthcare users, to function as decision-supporting information. Using the test case of the Dutch Consumer Quality Index (Box 1.1), five studies are described, which were conducted between 2006 and 2009. The two studies in the first part of this thesis focus on the case-mix adjustment of consumer assessment data before the information is

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[1] The term 'healthcare users' is used to refer to patients, (healthcare) consumers, future patients or healthcare users, customers, and citizens in a broad perspective. It should be noted that the term chosen often relates to the image of the healthcare user. For example, from a market-based perspective, patients are often depicted as consumers. From the perspective of the emancipation movement, patients are more often depicted as citizens. We use the term healthcare user in order to have a more or less 'neutral' term. However, to indicate information based on healthcare users' own quality asessments, the term 'consumer assessment data' is used, since this term is widely applied internationally.

published to healthcare users on the Internet. The second part concerns three studies and identifies common and effective presentation approaches of consumer assessment data. In the discussion, the most important implications of our studies are assembled and expounded. In the present chapter, we outline a general background of the thesis and describe the current situation as to comparative healthcare information in the Netherlands.

Box 1.1 The Consumer Quality Index

What is the Consumer Quality Index (CQ-index or CQI)?
- National standard to measure healthcare quality from the perspective of healthcare users.
- Based on American CAHPS (Consumer Assessment of Healthcare Providers and Systems) and Dutch QUOTE (QUality Of care Through the patient's Eyes) instruments.
- Collection of instruments (surveys or interview protocols).
- Collection of protocols and guidelines for sampling, data collection, analysis, and reporting formats.
- Registered trademark owned by the Dutch Centre for Consumer Experience in Health Care (CKZ).

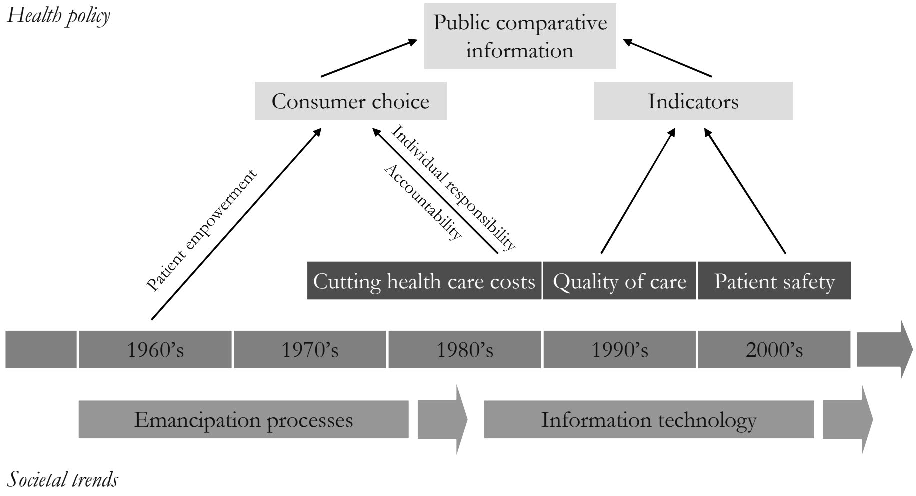
What is being measured by the Consumer Quality Index?
- What healthcare users find important in healthcare.
- What their actual experiences are.
- How they rate the overall quality of care.

What types of questions are included in the Consumer Quality Index?
- Frequency with which quality criteria are met: Never, sometimes, usually, always.
- Importance of quality criteria: Not important to extremely important.
- Access to care and the degree to which lack of access is perceived as a problem: A big problem, a small problem, not a problem.
- General rating of the quality of care: Scale from 0 (worst possible) to 10 (best possible).
- Effects of care and adherence to professional guidelines.
- Background characteristics: Age, gender, ethnicity, education, general health status, comorbidity.

Background

Public reporting about healthcare performance has become a central cornerstone in many Western countries' healthcare systems, following its implementation in the United States and the United Kingdom since the late 1980's (Marshall et al., 2000). Different drivers of this development have been essential in nearly all countries adopting a public reporting system in healthcare, such as information technology and the development towards more public accountability (Hardey, 2001; Anderson, Rainey, and Eysenbach, 2003; Adams and De Bont, 2007). Figure 1.1 provides a schematic overview of these developments. We differentiated between general societal trends (the emancipation movement and information technology) and healthcare policy trends (controlling healthcare costs and growing attention for quality and safety in healthcare). Partly as reaction to the implementation of market mechanisms in healthcare, increasing attention for quality and safety since the 1990's has resulted in the development of quality indicators in many countries. The availability of information about healthcare quality plus a growing emphasis on individual healthcare user choice can be regarded as the main stimuli for the emergence of public comparative information. In the next sections, several main drivers behind public comparative healthcare information described in Figure 1.1 are further specified.

Figure 1.1 Drivers of public comparative information



Patient empowerment

In modern healthcare, it is generally accepted that healthcare users and healthcare professionals should have more or less equal relationships (Coulter, 1999; Taylor, 2009). This model has replaced previous models of more paternalistic, directive, 'doctor-centered' interaction between the healthcare professional and the healthcare user (Balint and Shelton, 1996; Taylor, 2009). The changing concept of patients as autonomous consumers challenging professional power and paternalism has caused healthcare users - or their representatives - to strive for shared decision making, shared responsibilities, and shared information (Williamson, 2008).

The notion that individual healthcare users have a right to information that fulfils their needs has steadily gained ground. Healthcare users have more and more access to information (Hardey, 1999; McKinlay and Marceau, 2002), traditionally the area of doctors and nurses (Turner, 1995). Kivits (2004), for example, identified healthcare users' notion of their right to check, compare, confront, and discuss medical information given during the consultation. Williamson (2008), who examined the guiding principles of the activist patient movement, identified no theoretical limits to the amount of information healthcare users should be offered. Comparative healthcare information is often seen as one of the tools created for individual healthcare users to empower themselves; using this information to make reasoned decisions and to discuss the information with healthcare professionals.

As a consequence of the emerging patient empowerment ideology, healthcare users have also become more and more organized as social movements in the 1970's and 1980's (Trappenburg 2008; Williamson, 2008). In the Netherlands, patient organizations contributed to the development of several patient laws that mention the right for information (Van der Weijden, Van Veendendaal, and Timmermans, 2007; Delnoij, 2009). Furthermore, organized healthcare users in different European countries participate in the development of national guidelines and performance indicators that should inform both healthcare professionals and the public about healthcare performance (Williamson, 2008; Trappenburg 2008). Patient organizations can also contribute to the dissemination of comparative healthcare information. For example, they can stimulate data collection, collect data themselves, provide data through the Internet or other information sources, or use the information in their representation of interests.

Healthcare reforms towards market mechanisms

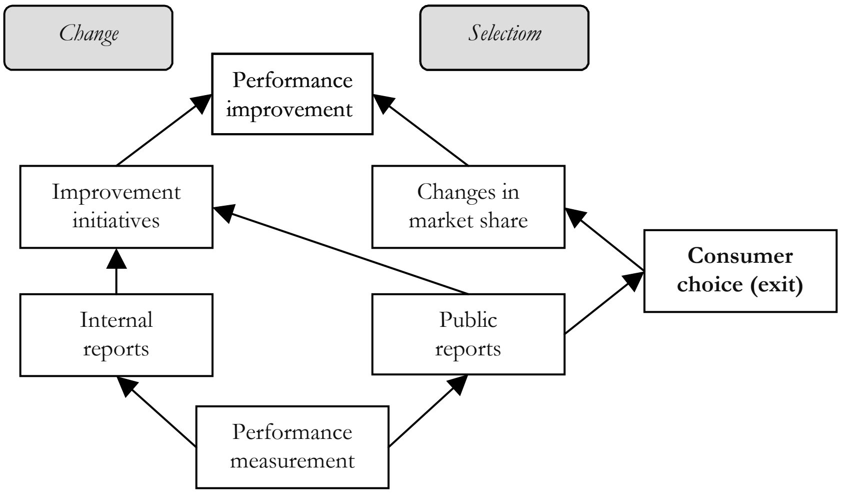
Another development dominant in Western societies is the effort to cut spiraling healthcare costs by introducing more market forces in the healthcare system (Newman and Kuhlmann, 2007). Like organizational restructuring in other public sectors, relations with customers and their demands are increasingly emphasized (Du Gay and Salaman, 1992). Consequently, healthcare users are expected to assume significant responsibility for monitoring their own health status and organizing their treatment and recovery (Pratt et al., 2006; Ter Meulen and Maarse, 2008). Or, in the words of Angela Coulter - at that time director of the Picker Institute Europe -: *"Self help and informed choice is to be encouraged in the hope that it will keep costs down and ensure that demands for healthcare are channeled appropriately"* (Coulter, 1999). Although more market forces in healthcare systems usually imply quasi-markets or regulated competition - since governments partly regulate the market in consideration of social policy aims (LeGrand and Bartlett, 1993) - , healthcare systems are increasingly discarding governmental control (Van der Kraan, 2006). Comparative healthcare information can be seen as one of the tools to strengthen healthcare users' self-help abilities, and to shift more responsibility to healthcare users themselves.

The inclusion of healthcare users as actors in the healthcare market is based on theoretical assumptions about the effects of users' selection and choice. These assumptions stem back to the theory of Hirschmann (1970) about how organizations deal with the expressed opinion of their customers. Hirschmann suggested that individuals who are not satisfied with the performance of an organization switch to another organization ('exiting') or remain with the organization but attempt to improve its performance by 'voicing' their dissatisfaction.

Berwick, James, and Coye (2003) further extended these mechanisms in healthcare markets by distinguishing between two pathways to quality improvement and emphasizing the role of transparency. The first pathway - *selection* - corresponds to what Hirschmann called 'exit': users opt for other providers when they are informed about underperformance of their own organization. High performing providers will attract more healthcare users and low performers will be driven out of the market, which will ultimately result in an overall performance improvement in the healthcare sector (Marshall et al., 2000; Berwick, James, and Coye, 2003). How many healthcare users should exactly apply selection before the model will work remains unclear. However, when a minority of the public selects best performing providers, this could be sufficient to stimulate market shifts and quality improvement. Furthermore, not every healthcare user might need to check comparative information to produce effective selection mechanisms. Users can bring about an effect by passing information on to friends and family, who show selection behavior without ever viewing the actual information themselves. This is thought to be especially effective when performance results are spread by opinion leaders (Ranganathan et al., 2009).

The second pathway - *change* - occurs when healthcare providers are informed about their own performance (compared to others) in so called 'internal reports'. Providers are believed to start or continue quality improvement initiatives when confronted with unsatisfactory performance (Berwick, James, and Coye, 2003; Brien, Dixon, and Ghali, 2009). In addition to providers' change as reaction to internal reports, providers can start change in reaction to public reports as well. In that case, comparative healthcare information influences quality of care through a 'public image' pathway (providers that react on public information through a threat to their public image; Berwick, James, and Coye, 2003; Hibbard, Stockard, and Tusler, 2005b; Werner and Asch, 2005; Fung et al., 2008). Figure 1.2 displays the model of performance improvement, based on the principles of Berwick and colleagues.

Figure 1.2 Model of performance improvement based on Berwick, James, and Coye (2003)



Information technology

The recent emphasis on healthcare users as a well-informed party on the healthcare market would not have been possible without today's information technology. Users' options to find and use information have rapidly increased since the emergence of computers. Since the 1970's and 1980's, computers have been used to promote health and teach the public about health issues (Fogg, 2003). It has been argued that in the past, healthcare users also searched for information outside their medical trajectory (also called the 'lay referral system') (Snelders and Meijman, 2009). However, the emergence of the Internet in the late 1990's accelerated this process and created a constant flow of highly accessible, interactive information that can be sought for by many healthcare users (Hardey, 2001). In addition, the Internet facilitates regular publication or update of information and advanced, user-oriented information design (Anderson, Rainey, and Eysenbach, 2003). The number of Internet users worldwide has considerably increased in the last decade, and the numbers of people using the Internet for health purposes are still growing (Eaton, 2002; Baker et al., 2003, Ybarra and Suman, 2006). In the Netherlands, 86% of the households had Internet access in 2008 (CBS, 2008). Kummervold et al. (2008) found an average increase between 2005 and 2007 of 10% to 52% of Internet users searching for health information across seven European countries. The Internet is also increasingly used for 'e-shopping' and product comparison. In 2008, 67% of the Dutch Internet users had used the Internet for e-shopping purposes (CBS, 2008).

Comparative healthcare information is a relatively new information type among the existing health information being published. In short, there has been a development from publishing information about diseases, prevention of disease and lifestyle advice to information for active participation in health management and healthcare decisions (Hardey, 2001; Anderson, Rainey, and Eysenbach, 2003). A frequently mentioned potential danger is the risk of easily overloaded healthcare users (Tweede Kamer der Staten-Generaal, 2005; Schwarz, 2004). This has been called the 'paradox of the reflexive consumer': the need for information to support decision making, but also the uncertainty that healthcare users face in view of all these alternatives (Schwarz, 2004; Kivits, 2004). Furthermore, it has been proposed that information technology can bring about an 'inverse information law': access to appropriate information may be particularly difficult for those who need it most (Eysenbach, 2000). Adams and De Bont (2007) elaborated on these paradoxes and complexities. On the one hand, reflexive and informed healthcare users are envisioned with highly specified information needs, as well as skills and tactics for acquiring information. On the other hand, discourses focus on healthcare users being incompetent and unskilled to manage the information. A recent survey by Statistics Netherlands showed that only one out of seven Internet users is very skilled in the use of the Internet (CBS, 2008). In accordance with this apparent lack of information management skills, much emphasis in information technology has been placed on design, usability and simple language as means to adjust to users' limited navigation and decision abilities (Taylor, 2009).

So, the emergence of comparative healthcare information stems back from different developments and ideas. Using Internet technologies, well-informed healthcare users can participate in healthcare decisions and stimulate healthcare providers and insurers to compete for their interests. This consumerism in healthcare is conceptually appealing, as the new role of healthcare users could meet several needs, and supposed economic benefits and social participation are connected (Du Gay and Salaman, 1992; Dowding and John, 2008). For healthcare users to be engaged, well-informed actors in the healthcare market, the publication of reliable and valid comparative information on healthcare performance is a prerequisite (Shaller et al., 2003). However, besides the provision of comparative information, there are several other basic conditions that should be met, before healthcare user choice will drive competition and concurrently empower users (Maarse and Ter Meulen: enhanced consumer choice as 'magic bullet'). Apart from the implicit assumption that healthcare users have the ability and are willing to make decisions, two important conditions mentioned in the literature are:

1. The availability of accurate comparative information that reflects healthcare quality (Zaslavsky, 2001; Mannion and Davies, 2002; Nelson et al., 2005);
2. Effective presentation of the information that facilitates decision making in healthcare (Hibbard et al., 2002a; Nelson et al., 2005; Taylor, 2009).

In the next sections, these two conditions are specified and embedded in a user choice framework.

Accurate information and the adjustment for case-mix effects

Since the emergence of comparative healthcare information, many discussions have been devoted to information accuracy. Both governments (Ministry VWS, 2001b) and researchers (Christiansen and Morris, 1997; Zaslavsky, 2001; Austin, 2005) mention reliability, validity, and appropriate statistical methods as important conditions of public comparative information. Important issues are proper survey sampling methods, data collection modes, survey questions, and methods used for longitudinal comparisons. One of the primary focuses has been placed on case-mix adjustment, which is the statistical adjustment of performance ratings for differences between the healthcare user groups seen by different providers. For example, it is known that older healthcare users generally report more positive experiences about the healthcare received than younger users. Ratings on the Internet are supposed to reflect the quality of care that is provided and not variation across providers in the distribution of older and younger healthcare users (Mannion and Davies, 2002; Zaslavsky, 2001; Glazer and McGuire, 2006). Hence, one crucial aspect is how to guarantee fair comparisons between healthcare providers or health insurance plans.

Conceptual considerations for case-mix adjustment

This case-mix adjustment of comparative healthcare information is important for several reasons. First, healthcare users should not be deceived by the information and subsequently make a 'wrong' decision. Consider a young man searching for a family practitioner in his new area of residence and viewing on the Internet that practitioner A has an excellent performance compared to practitioner B. He decides to visit practitioner A. However, when the information was not adjusted for case-mix effects and practitioner A mainly treated older patients while practitioner B mainly treated younger patients, the observed differences in quality ratings may have been misleading. Practitioner B may have been a better choice for the young man. Second, apart from misleading healthcare users, it would be unfair to healthcare providers or insurers to ignore case-mix effects (Zaslavsky, 2001; Mehta et al., 2008). If unadjusted ratings are published, this may threaten the market position of healthcare providers that treated more healthcare user groups with adverse case-mix effects. Healthcare providers feeling threatened could remain skeptical about the information (Anderson, Rainey, and Eysenbach, 2003; Glance et al., 2006) and not take on a role as information guides to healthcare users. More importantly, unfair competition is not desirable because it can create incentives to avoid treating particular healthcare user subgroups (Zaslavsky, 2001).

However, case-mix adjustment has not been unequivocally regarded as necessary. It can be especially controversial when case-mix adjusters relate to vulnerable populations like racial/ethnic minorities or healthcare users from poor areas of residence (Romano, 2000; Zaslavsky, 2001; Davies, Washington, and Bindman, 2002). It has been suggested that adjusting for variables like ethnic background rewards providers that fail to provide good quality to healthcare users of vulnerable populations (Romano, 2000; Fiscella et al., 2000). As adjustment may mask quality differences between healthcare user subgroups, this has been called 'making bad apples look good'. In extreme cases, healthcare providers might be excused for inequities in healthcare quality. Following this perspective, researchers have advocated another approach of dealing with differences in healthcare user subgroups' experiences, namely stratification of performance reports (Zaslavsky and Epstein, 2005). These reports present separate comparisons of various healthcare user subpopulations, in stead of or in addition to case-mix adjusted information.

From this, it is clear that decisions about case-mix adjustment are complex and sensitive. A perspective that is helpful is to split up differences in healthcare user subgroup experiences into those attributable to response bias and those attributable to 'real' differences. Response bias has been defined as *"a systematic tendency to respond to a range of questionnaire items on some other basis than the specific item content"* (Paulhus, 1991). More specifically related to healthcare user experience surveys is positive response tendency (PRT): *"a tendency for some respondents to evaluate care more positively than others, given the same underlying experiences"* (Elliott et al., 2009). For example, PRT is almost certainly present in the case of low educated people reporting more favorably to questions about healthcare experiences than highly educated people. After all, it is unlikely that healthcare users with better education receive lower quality of care. In contrast, real differences are present when different healthcare user subgroups receive distinct healthcare and perhaps even substandard care.

Both theoretical and statistical criteria for the selection of case-mix adjusters should be carefully examined. The statistical criteria applied by Zaslavsky and colleagues (Zaslavsky, 2001; O'Malley et al., 2005) are an example of a systematic method to identify variables eligible for case-mix adjustment. This 'impact factor' method uses the product of two measures, namely the predictive power of a candidate case-mix adjuster and the heterogeneity of the candidate case-mix adjuster across healthcare providers. Such statistical criteria are needed to prevent randomly selected case-mix adjusters which may affect providers' ranking substantially. Summarizing these arguments, adequate case-mix adjustment using robust statistical methods is an important condition for the success of public comparative healthcare information in market-based healthcare systems.

Decision making and effective presentation of information

Previous research has shown mixed results concerning healthcare users' interest in and use of comparative healthcare information. Several studies found that healthcare users want free choice in healthcare and say that they are interested in comparative quality information (Edgman-Levitan and Cleary, 1996; Robinson and Brodie, 1997; Van Rijen, 2003; Nelson et al., 2005; O'Meara et al., 2005). However, in the United States, where this kind of information has been published for about two decades, healthcare users have not actually utilized the information in large numbers (Schneider and Epstein, 1998; Marshall et al., 2000; Fung et al., 2008; Castle, 2009). Many researchers have thus concluded that simply providing healthcare users with more information will not increase active decision making in healthcare (Marshall et al., 2000; Harris-Kojetin et al., 2001).

Barriers to an active use of comparative healthcare information

This gap between healthcare users' stated preference for comparative healthcare information and their actual use of this information has caused researchers to search for potential barriers. In the general context of health information, Henwood et al. (2003) identified three constraints on the emergence of the 'informed patient', which are also acknowledged by other researchers:

1. A reluctance to take on the new responsibility implied by the 'informed patient' discourse;
2. Problems with information literacy;
3. The everyday practice of the medical encounter.

The authors argue that the call for more information has merely come from stakeholders involved in measuring and publishing information, and not from healthcare users themselves. Healthcare users may not be that rational and reflexive as is assumed, and may prefer a more 'passive' role (Lupton, 1997; Henwood et al., 2003). Concerning information literacy, deficient 'health literacy' (the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions) has been found in many American studies. Low and marginal health literacy are prevalent among great parts (25 to 50%) of the American population (Paasche-Orlow et al., 2005). As a more quantitative aspect of health literacy, 'health numeracy' is a particularly important skill needed for making health judgments. Many users, however, lack numeracy skills such as the ability to solve simple ratio and decimal problems (Reyna and Brainerd, 2007). The final barrier described by Henwood et al. (2003) (the everyday practice of the medical encounter) has been mainly depicted in medical sociology. Despite more informed healthcare users entering the medical consultation, both physicians and healthcare users can be unwilling or reluctant to discuss this information during their interaction (Massé et al., 2001; Henwood et al., 2003).

In contrast to these not too optimistic expectations of informed healthcare users using the Internet, other researchers have been more positive. Williamson (2008) asserted that activist healthcare users do strive for more information, and that 'awareness raising' or showing people the implications of what they had taken for granted is fundamental to an emancipation movement. So perhaps more passive, non-activist healthcare users are simply unaware of healthcare quality differences. In addition, although healthcare users' utilization of information might not answer expectations about the 'informed patient' challenging professional power, it might nevertheless fulfill their own needs of becoming more knowledgeable (Kivits, 2004).

In addition to these general accounts of the 'informed patient' and health information, there has been some specific research about healthcare users' utilization of comparative healthcare information. These studies showed that healthcare users' comprehension and interpretation of comparative healthcare information are indeed problematic (Hibbard and Jewett, 1997; Scanlon et al., 1998; Goldstein and Fyock, 2001; Gerteis et al., 2007; Greene et al., 2008). In addition, some -but not all- user groups seem to prefer other information sources than public performance reports. Two recent systematic reviews (Fung et al., 2008; Faber et al., 2009) pointed out two general barriers to the use of comparative healthcare information:

1. Problematic access to the information (physical access and awareness);
2. Ineffective information presentation.

The bottle-necks described by Ranganathan et al. (2009) correspond to these two barriers, namely that healthcare users are unaware of quality differences in healthcare, that the information may not be presented on the level that healthcare users want, and that the information is not presented comprehensively or at the right time.

Information presentation

Badly developed presentation formats are thus regarded as one of the underlying reasons for a lack of interest in and use of comparative healthcare information (Harris-Kojetin et al., 2001; Vaiana and McGlynn, 2002; Hibbard, Stockard, and Tusler, 2005a). The significance of an effective presentation is acknowledged more and more (Hibbard and Peters, 2003), and several studies have tried to take advantage of what is known from psychological decision research and cognitive science to improve the presentation of information (Peters et al., 2007a).

It is now well-known that presentation formats influence how well the information is understood and managed by users (Payne, Bettman, and Johnson, 1993; Thaler and Sunstein, 2008). People adapt their strategies to process and use information depending on so called task and context features. Some presentation approaches particularly strengthen the processability of comparative information (Russo, 1977; Bettman, Payne, and Staelin, 1986), such as hierarchical information organization, the use of symbols, and salient color and type size. Prior studies also demonstrated that people rely on simple heuristics when information becomes too complex (or too much). This means that information is used selectively and not explicitly considered across all alternatives and attributes. The theory of constructed preference (Slovic, 1995) further asserts that preferences are not stable, but are constructed in the course of information processing. This would also suggest that presentation formats can largely influence users' interpretation of the information. In addition, this implies that asking about preferences would not be sufficient for the development of supportive presentation formats (Slovic, 1995; Lichtenstein and

Slovic, 2006). To improve presentation formats that support healthcare user decision making, other research methods are necessary.

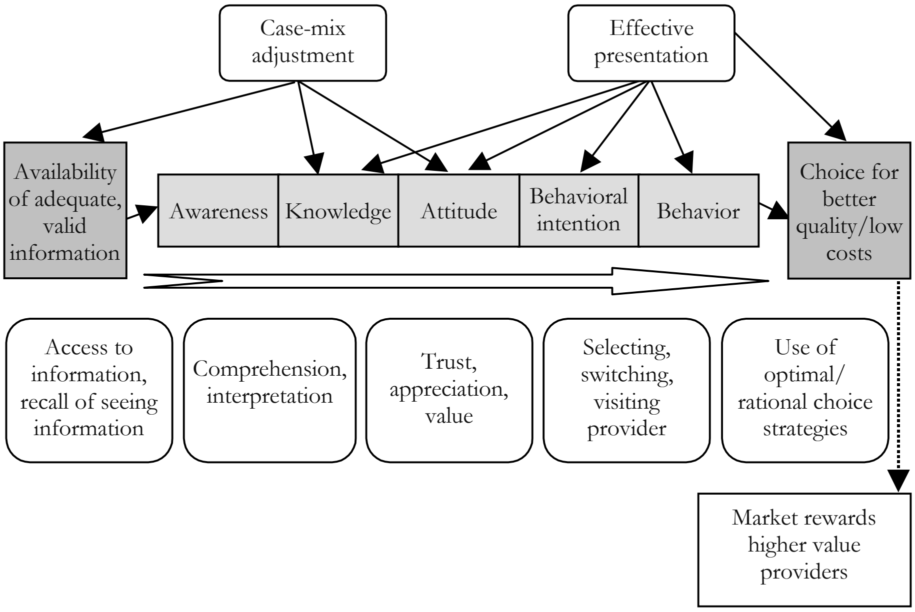
Important work has been done by Judith Hibbard and colleagues. These researchers conducted several controlled experimental studies in which they manipulated presentation approaches of comparative healthcare information, including CAHPS information (Hibbard et al., 2001a; Hibbard et al., 2002a; Greene et al., 2008). Some effective presentation formats were demonstrated in these studies, such as visual cues in combination with bar charts, ordering providers by performance, and frameworks emphasizing key information. Hibbard clarified these findings by the 'evaluability' principle, that is, "*the principle that the weight given to an attribute in a choice is proportional to the ease or precision with which the value of that attribute (or a comparison of the attribute across alternatives) creates an affective (good/bad) feeling*" (Hibbard et al., 2002a). Apart from these few studies, there is limited knowledge about how presentation approaches facilitate healthcare users' use of comparative healthcare information.

User choice framework

Based on the above described criteria and potential barriers to the use of healthcare information, the following user choice framework is outlined as frame of reference of this thesis (Figure 1.3). The framework is used to position the two conditions of adequate case-mix adjustment and effective presentation into the overall process of a healthcare user's choice. In this thesis, we concentrate on the two conditions, and we do not deal with the whole framework. The basic principles described by Faber et al. (2009) served as main input for the framework.

The first step in creating useful comparative healthcare information is to assemble adequate information that reflects quality of healthcare. For this purpose, decisions about case-mix adjustment should be made, based on thorough statistical methods. This information should then be publicly disclosed, which is usually done through the Internet. Healthcare users need to have access to the Internet and become aware of the existence of the information. When healthcare users see the information, it is crucial that they comprehend both the information and the general concept of healthcare quality, so that they can make realistic predictions of the consequences of their choices. Health and information literacy and numeracy are important skills needed in this phase, as well as users' own motivation to try to understand the information. If healthcare users are left confused by the information, they will not value the information, and develop a negative attitude towards it. Clear explanations about how case-mix adjusted performance ratings were calculated thus seem necessary for a positive attitude.

Figure 1.3 User choice framework



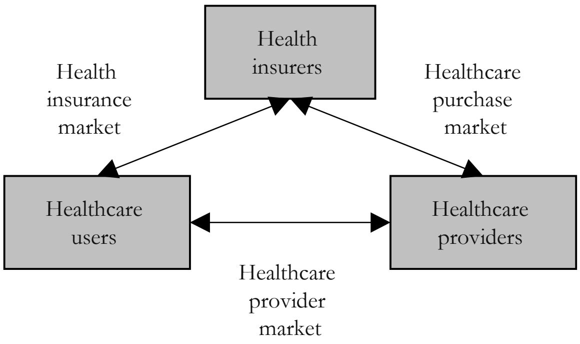
A positive attitude is the major driver for a behavioral intention to use the information. The behavior can consist of selecting a new provider, switching to another provider or visiting a particular provider. It could be that healthcare users do not switch, although they do have a positive attitude towards the information. Following psychological attitude theories (Azjen and Fishbein, 1980; Eagly and Chaiken, 1993), other factors such as perceived self-efficacy, motivation, habits, and the opinion of relevant others could impede the formation of a behavioral intention or actual behavior. Furthermore, circumstances such as people's pressure of activities or important life events may take up available time and obstruct informed decision making. But even if healthcare users are undertaking actions, these actions should be based on optimal rational choice strategies to contribute to a functional market based on user choice. Although we know that individuals do not always choose optimally (Hsee and Hastie, 2006), a certain amount of rationality applied by healthcare users is assumed. This rational healthcare user would strive for an optimal combination of healthcare attributes at low costs. A final assumption in the framework is that the market rewards providers that provide good healthcare. Here, the selection and change pathways described in Figure 1.2 come up.

Comparative healthcare information in the Netherlands

In the past few years, major healthcare reforms have been implemented in the Netherlands. Enhanced healthcare user choice is an important element that should contribute to a more demand-driven healthcare system based on regulated competition (Ministry VWS, 2001a). Consequently, more emphasis has been placed on transparency in healthcare. As stated in the 'Healthcare Market Regulation Act' (WMG) - established in 2006 - healthcare providers are obliged to inform the public about price, quality and other healthcare characteristics to stimulate transparency in the healthcare system (Kamerstukken II 2004-2005, 30186, nr.3). Although the emphasis on transparency is often linked to patient empowerment and a right of the public to know, comparative healthcare information has been mainly promoted as mechanism to control costs and to create more efficient healthcare (Leys, 2003; Maarse and Ter Meulen, 2006; Delnoij, 2009). Healthcare users are thought to be one party within a system of interconnected markets that have been introduced in the healthcare system (Figure 1.4):

- A health insurance market, where healthcare users can choose between health plans;
- A provider market, where healthcare users can choose between healthcare providers, such as hospitals, nursing homes, and family practices;
- A healthcare purchasing market, where health insurance companies can contract healthcare providers and stimulate them to improve quality of the provided healthcare.

Figure 1.4 The markets in the Dutch healthcare system



Healthcare users are encouraged to exercise choice both at the provider market and the health insurance market, which should stimulate providers to provide healthcare of high quality at relatively low prices through selection and change pathways. In addition, through their choices at the health insurance market, quality of healthcare is under discussion in the negotiations between health insurers and healthcare providers.

Part of the implementation of healthcare reforms was the establishment of the website www.kiesBeter.nl ('choose better') by the National Institute of Public Health and the Environment (RIVM). This website (and other initiatives that have been released) aim to inform Dutch healthcare users about the options and quality in healthcare. Within the new Dutch healthcare system, a key role has been envisioned for information based on healthcare users' own quality assessments. This so called 'consumer assessment data' will be the main focus of this thesis. Therefore, we will first outline the Dutch instrument to measure quality of care from the healthcare user's perspective, and describe this instrument in the context of other consumer assessments of healthcare quality and the current Dutch healthcare system.

The Consumer Quality Index

Involving the healthcare user's perspective in defining and assessing healthcare quality has gained ground in several countries (Sixma et al., 1998; Groenewegen et al., 2005; Sofaer and Firminger, 2005; Darby, Crofton, and Clancy, 2006; Bokhour et al., 2009). One of the most well known initiatives to measure quality of care from the healthcare user's perspective is CAHPS in the United States. Other initiatives are the Picker instruments in the United Kingdom and the National Danish Survey of Patient Experiences in Denmark. Central in all these surveys is that they measure quality of care from the perspective of healthcare users, which usually concerns aspects like the courtesy and respect with which healthcare users are treated, clarity of communication with healthcare users, shared-decision making and accessibility of healthcare.

In the Netherlands, Consumer Quality Index (CQ-index or CQI) surveys have been developed to measure healthcare user experience in healthcare (Box 1.1). This series of questionnaires has become the national standard for healthcare users' quality assessment and is guarded by the Dutch Centre for Consumer Experience in Health Care (CKZ) (Delnoij, 2006). CQI instruments are either surveys or interview protocols that assess the experiences of healthcare users with healthcare. Both generic (e.g. health plans, hospitals, nursing homes, family practice care) and disease-specific (e.g. cataract, breast cancer, rheumatoid arthritis) instruments have been developed and tested (Stubbe, Brouwer, and Delnoij, 2007; Zuidgeest, Sixma, and Rademakers, 2009; Damman, Hendriks, and Sixma, 2009; Wiegers, 2009; Berendsen et al., 2009). Besides a series of surveys, the CQ-index also refers to a series of standardized protocols and manuals concerning sampling, data collection, data-entry, data-analyses and data reporting (Delnoij and Hendriks, 2008).

The development of a CQI instrument consists of several phases (Rademakers et al., 2008) and starts with qualitative methods aimed to identify quality aspects most important to healthcare users. Central in this phase are focus group discussions with healthcare users. After the qualitative phase, a pilot survey is constructed and quantitatively tested among a relatively small sample of healthcare users. Finally, to assess whether the survey can measure differences between healthcare providers (which is important for comparative information), a large scale test is performed (see, for more details, Rademakers et al., 2008). Subsequently, the survey is approved by the CKZ, and is ready to be used by healthcare providers, health insurance companies, patient associations, and others.

Public reporting of CQI information

Thus far, the Ministry of Health, Welfare, and Sports, the Health Care Transparency Programme (Zichtbare Zorg), and Stichting Miletus (a concordance of health insurance companies) have been the main drivers and sponsors of CQI measurements. For health plans, nursing homes, home care, and care for the disabled, CQI information has been published as comparative healthcare information on kiesBeter. Additionally, the Consumentenbond (the Consumer Association in the Netherlands) presented CQI information about health plans on the website www.consumentenbond.nl for members only. Recently, the Federation of Patients and Consumer Organizations in the Netherlands (NPCF) published hospital-level CQI information about cataract surgery and total hip or knee replacement on the website www.consumentendezorg.nl. Apart from that, CQI information can be found on the websites of health insurance companies that are part of Stichting Miletus.

Practically all these websites present the information using visual displays, usually bar charts and symbols. This is consistent with typical reporting formats in the United States (Rosenstein, 2004). General topics, which are composite scores of CQI survey items, are displayed, such as accessibility of healthcare, information provision, and conduct of healthcare professionals. Qualitative studies have shown that such general composites are relevant to healthcare users (Laine et al., 1996; Hibbard, Slovic, and Jewett, 1997; Goldstein and

Fyock, 2001; Sofaer and Firminger, 2005). Overall, however, it remains largely unclear how the information should be adapted and presented on these websites. Due to a lack of scientific studies, CQI information in the Netherlands has been created and presented on the basis of American CAHPS protocols and a dialogue with the involved healthcare sector.

Concerning case-mix adjustment, conservative approaches are usually adopted. This means that minimal adjustment is performed: only for those characteristics without suspicion of any systematic healthcare user subgroup differences in the provided healthcare. But apart from these considerations, it remains unclear which statistical considerations should be relevant. Different reporting initiatives of consumer assessment data have used separate statistical models (Barr et al., 2004). But how can case-mix adjusters for healthcare user experiences best be analyzed and selected? And perhaps more importantly in the light of public comparative information, how should we deal with case-mix adjustment when there are systematic differences between healthcare user subgroups? Is the 'impact factor' method proposed by Zaslavsky and colleagues an efficient approach to assess case-mix adjusters of Dutch CQI information? CAHPS methods imply statistical methods that create aggregate information for an 'average healthcare user'. Recent evolvement of statistical hierarchical modeling, thus far not incorporated in consumer assessments of healthcare, may be useful to further optimize case-mix adjustment.

As for effective presentation, star ratings have been the most frequently used visual display of CQI information. However, other symbols have been used as well, such as round icons. In addition, websites have presented bar graphs showing percentages of respondents' answers to questionnaire items (in addition to composite measures). Although the work of Hibbard and colleagues gives important suggestions to present comparative healthcare information (Hibbard, Slovic, and Jewett, 1997; Hibbard et al., 2001a; Hibbard et al., 2002a), we do not know which specific presentation approaches of CQI information support healthcare users' choices. Another gap in the literature is how consumer assessment information can be presented in combination with other types of comparative healthcare information. Finally and importantly, no studies have systematically assessed how Dutch healthcare users, who do not have a lot of experience with this kind of information, manage online comparative healthcare information.

In short, different case-mix adjustment strategies and presentation formats have been used in different Dutch healthcare sectors and on different websites. Comparative healthcare information based on the CQ-index has evolved without systematic evaluations and without consideration of healthcare users' needs. This lack of uniformity is unwanted, since comparative information on the quality of healthcare is very complex in itself (Jewett and Hibbard, 1996; Hibbard et al., 1998; Harris-Kojetin et al., 2001). In addition, the information is relatively new and probably unfamiliar to most Dutch healthcare users. If healthcare users are provided with a great diversity of information types and formats, it seems unlikely that they will effectively use the information in the way described in the user choice framework (Figure 1.3).

Following these arguments, how should CQI information then be adjusted and presented to function as decision supporting[2] information for healthcare users?

Design of this thesis and research questions

This thesis was designed to thoroughly investigate public CQI information, and it is arranged among two basic conditions for its effectiveness: an adequate case-mix adjustment method and an effective presentation. The aim was to identify recommendations for policy, practice, and research. Although we explicitly focus on consumer assessment information, the described studies can be used in the broader perspective of general comparative healthcare information. Table 1.1 summarizes the design of the thesis.

Table 1.1 Overview of this thesis

Research Question	**Chapter**	**Methodology/Design**
1. Case-mix adjustment strategy	**Chapter 2.** Using multilevel modeling to assess case-mix adjusters in consumer experience surveys in healthcare	Comparison of two methods for case-mix adjustment: using CQI data Health and Health Insurer; impact factor approach and multilevel regression analysis
	Chapter 3. Differences between family practices in the influence of patient characteristics on healthcare experiences	Multilevel random effects analysis using CQI data Family Practice Care

- table 1.1 continues -

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[2] In this thesis, the terms 'decision supporting' and 'healthcare user supporting' are used to refer to the decision process that results in a choice for high quality (the best performer).

- table 1.1 continued -

Research Question	Chapter	Methodology/Design
2. Existing presentation formats	**Chapter 4.** An international comparison of web-based reporting about healthcare quality: content analysis	Descriptive review of website content; comparison of presentation formats
3. Presentation formats that support healthcare users	**Chapter 5.** Consumers' interpretation and use of comparative information on the quality of healthcare: the effect of presentation approaches	Experimental design using conjoint analysis; multilevel logistic regression analysis; fictitious CQI data Home Care
	Chapter 6. How do healthcare consumers process and evaluate comparative healthcare information? A qualitative study using cognitive interviews	Qualitative design using cognitive interviews; three existing Dutch websites

Part 1: Case-mix adjustment of CQI information

The main research question of the first part of the study is:

1. *"Which case-mix adjustment strategy should be applied to ensure fair comparisons between healthcare plans or providers?"*

Case-mix adjustments methods are investigated in the first 2 studies described in this thesis, and are based on secondary quantitative analyses of CQI data sets. More specifically, we used data from the CQI Health and Health Insurer survey in 2005 (Hendriks et al., 2005; Chapter 2) and the CQI Family Practice Care survey in 2007 (Meuwissen and De Bakker, 2008; Chapter 3). Multilevel regression analyses were performed and compared to the existing (non hierarchical) 'impact factor' approach (**Chapter 2**). In **Chapter 3**, we investigated the influence of case-mix adjusters on healthcare users' experiences across family practices. In both studies on case-mix adjustment methods, we considered exemplary comparative performance information, to relate the issue of case-mix adjustment to the design of information for healthcare users.

Part 2: Presentation of CQI information

The main questions of the second part of the study are:

2. *"How are different types of comparative healthcare information presented on the Internet?"*

3. *"Which presentation formats of comparative healthcare information support healthcare users?"*

The studies in part 2, which concern presentation approaches of CQI information, are based on different research methods. First, a descriptive study of presentation formats of existing comparative healthcare information was performed (**Chapter 4**). More in particular, we compared how different information types (such as clinical performance indicators and consumer assessment data) are presented to the public. Second, an experimental quantitative study using conjoint analysis methodology was used to identify effective presentation approaches **(Chapter 5**). In this study, the effects of specific CQI presentation approaches on healthcare users' correct interpretation and effective use of information were examined. Third, we conducted a qualitative study using cognitive interviews with healthcare users, who were prompted with existing comparative information (**Chapter 6**).

Chapter 7 proposes the most important conclusions and recommendations that follow from the studies for policy, practice, and research. However, several dilemmas emerged as well that need to be resolved. To implement the recommendations and improve comparative healthcare information, some directions for further research and policy discussion are described in this chapter.

2

Using multilevel modeling to assess case-mix adjusters in consumer experience surveys in healthcare

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Introduction

Public reporting of comparative healthcare information has become an important quality-improvement instrument in many countries (Marshall and Brook, 2002; Marshall et al., 2003; Mannion and Goddard, 2003). In the Netherlands, Consumer Quality Index (CQ-index or CQI) instruments have been developed to assess quality of healthcare from the consumer's perspective (Arah et al., 2006a; Delnoij et al., 2006; Stubbe, Gelsema, and Delnoij, 2007; Stubbe, Brouwer, and Delnoij, 2007). CQI instruments are based on the American CAHPS (Consumer Assessment of Healthcare Providers and Systems) questionnaires (Cleary and Edgman-Levitan, 1997; Zaslavsky et al., 2001; Zaslavsky et al., 2002) and Dutch QUOTE (QUality Of care Through the patient's Eyes) instruments (Sixma et al., 1998), which both measure consumers' experiences instead of inquiring after their satisfaction.

Theoretically, CQI ratings should be adjusted for a differential distribution of relevant consumer characteristics, so-called case-mix adjustment. This is important because, for example, some providers may receive poor ratings when they have many young consumers, who are generally less positive than older consumers (Zaslavsky et al., 2001). Besides age, a variety of characteristics have been found to be associated with healthcare experiences: self rated health status, education, sex, ethnicity, area of residence, income, language spoken at home, and health conditions (Arah et al., 2006a; Zaslavsky et al., 2001; O'Malley et al., 2005).

Different methods can be used to select consumer characteristics for adjusting experience scores and ratings. One method, used by CAHPS researchers in the United States (Zaslavsky et al., 2001; O'Malley et al., 2005; Kim, Zaslavsky, and Cleary, 2005) combines heterogeneity (the distribution of a characteristic across providers) and predictive power (the amount of variance the characteristic predicts) into an 'impact factor'. In research using CQI instruments, multilevel regression methods have been used to assess the performance of healthcare plans and providers and to investigate case-mix adjusters. This relatively new methodology has gained ground in analyzing hierarchical data in health services research (Leyland and Groenewegen, 2003; Arling et al., 2007; Frick et al., 1999; Zaslavsky, 2007; Davis et al., 2007). Despite its known statistical properties for handling clustered data as often seen in consumer experience surveys and institutional performance assessment (Goldstein and Spiegelhalter, 1996; Leyland and Boddy, 1997; Christiansen and Morris; 1997; Burgess et al., 2000; Merlo et al., 2005a; Merlo et al., 2006; Merlo, 2005), the multilevel regression method is rarely used for case-mix adjustment research.

The aim of this study was to investigate whether multilevel analysis is a useful tool to detect case-mix adjusters in consumer assessment of healthcare, and to compare this analysis with the impact factor approach.

Methods

Participants

Data collection took place in 2005 with the CQI health plan instrument 'Experiences with Healthcare and Health Insurer'. For the current study, we performed secondary data-analyses of the experiences of 11,539 respondents from 27 health plans.

Measurement

The CQI health plan instrument consists of items on health plan services and received healthcare in the past year. It contains 54 core items on consumer experiences, 4 global ratings (family physician, specialist, healthcare, and health plan), 1 item on the likelihood to recommend plans to friends and family, and several items on consumer characteristics. The questionnaire is partly a transformation of the CAHPS 3.0 Adult Commercial Questionnaire (Delnoij et al., 2006). We focused on 4 outcome variables (Table 2.1): the global rating of health plans and 3 experience scales (conduct of employees, health plan information, and reimbursement of claims) obtained from exploratory factor analysis of the experience items.

Statistical analyses

The following 6 consumer characteristics were considered as case-mix adjusters: age, self-rated health status, education, sex, ethnicity, and urbanization of area of residence. We used 2 methodologies to explore which characteristics affect health plan experience domains and ratings: multilevel analysis and impact factor analysis

Table 2.1 Outcome variables

Variable	Number of items	Items	Response categories	Cronbach's alpha
Global rating of health plan	1	Using any number from 0 to 10, where 0 is the worst health plan possible and 10 is the best health plan possible, what number would you use to rate your health plan?	0 to 10	
Conduct of employees	5	How often did your health plan's employees treat you with courtesy and respect? How often were your health plan's employees willing to help? How often did your health plan's employees listen carefully to you? How often did your health plan's employees explain things in a way that was easy to understand? How often did your health plan's employees spend enough time with you?	Never (1); Sometimes (2); Usually (3); Always (4)	$\alpha = .92$
Health plan information	3	How much of a problem was it for you to understand information that was mailed to you? How much of a problem was it for you to find information? How much of a problem was it for you to understand information that you found by yourself?	A big problem (1); A small problem (2); Not a problem (3)	$\alpha = .80$
Reimbursement of claims	2	How often did your health plan reimburse your claims in a short time period? How often did your health plan reimburse your claims correctly?	Never (1); Sometimes (2); Usually (3); Always (4)	$\alpha = .80$

Multilevel regression analysis

Multilevel linear regression analyses of consumers' experiences (N=11,539) nested within health plans (N=27) were performed. The first model contained no adjusters (model 0) and was the reference to which we compared other models with adjustments for only 1 consumer characteristic each (model 1 through model 6). A final seventh model adjusted for all characteristics. Both consumer and plan variance were estimated. We assessed the proportional changes in variance (PCV) (Merlo et al., 2005b) for the between-plan variance in each model to quantify the impact of adjustments on differences between plans. Specifically, the PCV was calculated as follows: absolute difference of the between-plan variance of the null model and the between-plan variance of the model with one or all characteristics included, divided by the between-plan variance of the null model. PCV's were calculated for plan variances only, because possible shifts in these variances reflect compositional or within-plan differences in the relevant consumer characteristic that influences plan ratings. A large PCV implicates that the characteristic is associated with relatively large alterations in the between-plan variance. In that case, quality rankings of plans are shifting, and the particular adjuster is relevant.

To illustrate the effects of adjustment on actual ratings, we considered the distribution of star ratings (*, worse than average, **, average, and ***, better than average) for the global rating of health plans. This is a common method for presenting quality information, using plan means with comparison intervals (Goldstein and Healy, 1995), and determining whether these intervals overlap with the overall mean across all health plans in the sample. We finally used Kendall's τ coefficients to measure the degree of correspondence between ordinal rankings of plans in different models.

Impact factor analysis

A consumer characteristic has impact when: (1) it is differentially distributed across health plan consumer populations (heterogeneity); and (2) it is associated with consumer experiences (predictive power) (O'Malley et al., 2005). The heterogeneity of each characteristic was calculated as the ratio of its between- and within-plan variance. Using traditional linear regressions, we estimated the predictive power of a specific consumer characteristic as the amount of variation predicted in a regression model including all consumer characteristics, minus the predicted variation in a model excluding the specific characteristic. Dummies for health plans were included in both models. Predictive power and heterogeneity were multiplied and divided by a rescaling factor, correcting for differences in response scales of the various outcome variables. The number was also multiplied by 1,000 for computational ease. As in previous research

(O'Malley et al., 2005; Arah et al., 2006b), a case-mix adjuster with impact factor above 1 was considered important:

$$\textit{Impact factor} = (\textit{predictive power} \times \textit{heterogeneity} \times 1000) / \textit{rescaling factor}$$

For the same characteristic regressed on different outcome variables, a higher impact factor means that the characteristic has a higher effect on the outcome. For any 2 characteristics regressed on the same outcome, a difference in their impact factors implies a comparable difference in their effects on the outcome.

Results

Table 2.2 summarizes respondents' characteristics.

Table 2.2 Person characteristics of the 11,539 respondents

Variable	N	%
Age:		
18 - 24	774	6.7
25 - 34	1,606	13.9
35 - 44	2,327	20.2
45 - 54	2,552	22.1
55 - 64	2,330	20.2
65 - 74	1,243	10.8
75 or older	707	6.1
Self rated overall health status:		
Excellent	1,767	15.3
Very good	3,034	26.3
Good	4,791	41.5
Fair	1,742	15.1
Poor	205	1.8
Sex:		
Female	5,717	49.5
Male	5,822	50.5
Educational level:		
1 (Low: no primary education)	78	0.7
2	653	5.7
3	1,910	16.6
4	404	3.5
5	1,492	12.9

- table 2.2 continues -

- table 2.2 continued -

Variable	N	%
6	2,273	19.7
7	1,142	9.9
8	2,587	22.4
9	812	7.0
10 (High: academic education)	188	1.6
Urbanization level:		
1 (Rural)	1,902	16.5
2	2,665	23.1
3	2,244	19.4
4	2,425	21.0
5 (Big cities)	2,303	20.0
Ethnicity:		
Non-Dutch	689	6.0
Dutch	10,850	94.0

Multilevel models

Table 2.3 describes the results of the multilevel regression analyses. The null model without adjustment showed significant variation between consumers and between health plans on all outcome variables.

For the global rating of health plans, the PCV's indicated that no more than 2% of the between-plan variances was explained by the included adjusters. The PCV for conduct of employees was 10% in all models including one characteristic, and 30% in the fully adjusted model. Concerning health plan information, adjusting for age only and later for all characteristics influenced the between-plan variance (PCV = 20%). The PCV for reimbursement of claims was 7% each in the model including education, as well as in the full model. In short, age and education seemed the most important adjusters.

Effect of adjustments on health plan ratings

Table 2.4 shows the shifts in star ratings on global rating of health plans in different models, compared with model 0. Adjusting for age had an impact on the ranking of 6 health plans. Kendall's τ coefficients showed positive significant correspondence between each model and model 0, indicating that rankings in different models did not differ significantly.

Table 2.3 Multilevel analyses of consumer experiences with health plans

	Model 0 null	**Model 1 age**	**Model 2 health**	**Model 3 education**	**Model 4 sex**	**Model 5 ethnicity**	**Model 6 urbanization**	**Model 7 full**
Global rating health plan (N=11,276)								
Intercept	7.556 (0.060)*	7.401 (0.065)*	7.553 (0.063)*	7.420 (0.065)*	7.569 (0.061)*	7.567 (0.060)*	7.640 (0.065)*	7.522 (0.075)*
Age 18-24 (reference = 35-44)		-0.454 (0.053)*						-0.459 (0.054)*
Age 25-34		-0.189 (0.041)*						-0.158 (0.041)*
Age 45-54		0.073 (0.037)						0.082 (0.036)*
Age 55-64		0.305 (0.038)*						0.297 (0.038)*
Age 65-74		0.627 (0.045)*						0.613 (0.047)*
Age >75		1.013 (0.056)*						1.027 (0.060)*
Health status excellent (reference = very good)			0.000 (0.039)					0.065 (0.038)
Health status good			-0.013 (0.031)					-0.159 (0.030)*
Health status fair			0.062 (0.040)					-0.258 (0.040)*
Health status poor			-0.123 (0.095)					-0.455 (0.092)*
Education 1 (reference = education 6)				0.513 (0.152)*				0.479 (0.148)*
Education 2				0.723 (0.058)*				0.303 (0.060)*
Education 3				0.376 (0.040)*				0.201 (0.041)*
Education 4				0.020 (0.070)				0.013 (0.068)
Education 5				0.292 (0.043)*				0.097 (0.044)*
Education 7				-0.027 (0.047)				-0.011 (0.046)
Education 8				-0.009 (0.038)				-0.060 (0.037)
Education 9				-0.126 (0.054)*				-0.118 (0.053)*

	Model 0 **null**	**Model 1** **age**	**Model 2** **health**	**Model 3** **education**	**Model 4** **sex**	**Model 5** **ethnicity**	**Model 6** **urbanization**	**Model 7** **full**
Education 10				-0.199 (0.100)*				-0.262 (0.098)*
Sex (reference = male)					-0.028 (0.025)			0.017 (0.024)
Ethnicity (reference = Dutch)						-0.177 (0.052)*		-0.086 (0.051)
Urbanization 1 (reference = urbanization 5)							-0.235 (0.043)*	-0.168 (0.042)*
Urbanization 2							-0.100 (0.038)*	-0.089 (0.037)*
Urbanization 3							-0.063 (0.040)	-0.043 (0.038)
Urbanization 4							-0.032 (0.038)	-0.028 (0.037)
Variance consumers	1.691 (0.023)*	1.577 (0.021)*	1.690 (0.023)*	1.643 (0.022)*	1.690 (0.023)*	1.689 (0.023)*	1.685 (0.022)*	1.549 (0.021)*
Variance health plans	0.092 (0.026)*	0.094 (0.027)*	0.092 (0.026)*	0.092 (0.026)*	0.092 (0.026)*	0.091 (0.026)*	0.090 (0.026)*	0.090 (0.026)*
PCV [a]		2.17%	0.00%	0.00%	0.00%	1.09%	2.17%	2.17%
-2 Log Likelihood	38003.350	37220.470	37997.360	37683.250	38002.080	37991.930	37968.790	37021.720
χ^2 [b]		782.88*	5.99	320.10*	1.27	11.42*	34.56*	981.63*
Δdf		6	4	9	1	1	4	25
ICC [c]	0.052	0.056	0.052	0.053	0.052	0.051	0.051	0.055
Conduct of employees (N=3,793)								
Intercept	3.469 (0.022)*	3.445 (0.028)*	3.480 (0.027)*	3.411 (0.029)*	3.492 (0.024)*	3.486 (0.021)*	3.511 (0.030)*	3.473 (0.042)*
Age 18-24 (reference = 35-44)		-0.133 (0.042)*						-0.145 (0.042)*
Age 25-34		-0.058 (0.032)						-0.058 (0.032)
Age 45-54		0.032 (0.029)						0.052 (0.029)
Age 55-64		0.067 (0.032)*						0.096 (0.032)*

	Model 0 null	**Model 1 age**	**Model 2 health**	**Model 3 education**	**Model 4 sex**	**Model 5 ethnicity**	**Model 6 urbanization**	**Model 7 full**
Age 65-74		0.138 (0.038)*						0.181 (0.039)*
Age >75		0.200 (0.050)*						0.287 (0.053)*
Health status excellent (reference = very good)			0.060 (0.033)					0.078 (0.032)*
Health status good			-0.006 (0.025)					-0.033 (0.025)
Health status fair			-0.057 (0.031)					-0.122 (0.032)*
Health status poor			-0.220 (0.027)*					-0.279 (0.064)*
Education 1 (reference = education 6)				-0.148 (0.137)				-0.076 (0.135)
Education 2				0.064 (0.059)				-0.011 (0.060)
Education 3				0.080 (0.035)*				0.037 (0.035)
Education 4				-0.049 (0.060)				-0.033 (0.059)
Education 5				0.105 (0.036)*				0.056 (0.037)
Education 7				0.078 (0.036)*				0.090 (0.036)*
Education 8				0.081 (0.029)*				0.072 (0.029)*
Education 9				0.057 (0.041)				0.076 (0.041)
Education 10				0.072 (0.076)				0.064 (0.075)
Sex (reference = male)					-0.043 (0.020)*			-0.017 (0.020)
Ethnicity (reference = Dutch)						-0.234 (0.040)*		-0.212 (0.040)*
Urbanization 1 (reference = urbanization 5)							-0.094 (0.034)*	-0.060 (0.034)
Urbanization 2							-0.030 (0.031)	-0.026 (0.031)
Urbanization 3							-0.041 (0.032)	-0.032 (0.032)
Urbanization 4							-0.044 (0.032)	-0.040 (0.042)

	Model 0 **null**	**Model 1** **age**	**Model 2** **health**	**Model 3** **education**	**Model 4** **sex**	**Model 5** **ethnicity**	**Model 6** **urbanization**	**Model 7** **full**
Variance consumers	0.365 (0.008)*	0.360 (0.008)*	0.363 (0.008)*	0.364 (0.008)*	0.365 (0.008)*	0.362 (0.008)*	0.365 (0.008)*	0.350 (0.008)*
Variance health plans	0.010 (0.003)*	0.009 (0.003)*	0.009 (0.003)*	0.009 (0.003)*	0.009 (0.003)*	0.009 (0.003)*	0.009 (0.003)*	0.007 (0.003)*
PCV [a]		10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	30.00%
-2 Log Likelihood	6985.424	6924.409	6962.335	6967.140	6980.832	6950.717	6977.351	6821.702
χ^2		61.02*	23.09*	18.28*	4.59*	34.71*	8.07	163.72*
Δdf		6	4	9	1	1	4	25
ICC [b]	0.027	0.024	0.024	0.024	0.024	0.024	0.024	0.020
Health plan information (N=2,468)								
Intercept	2.613 (0.018)*	2.612 (0.024)*	2.626 (0.023)*	2.580 (0.026)	2.610 (0.021)*	2.619 (0.018)*	2.615 (0.029)*	2.588 (0.042)*
Age 18-24 (reference = 35-44)		-0.106 (0.039)*						-0.127 (0.040)*
Age 25-34		0.021 (0.030)						0.022 (0.030)
Age 45-54		0.008 (0.029)						0.013 (0.029)
Age 55-64		0.037 (0.033)						0.048 (0.034)
Age 65-74		0.017 (0.050)						0.028 (0.051)
Age >75		-0.182 (0.107)						-0.143 (0.108)
Health status excellent (reference = very good)			0.051 (0.031)					0.057 (0.031)
Health status good			-0.025 (0.024)					-0.030 (0.025)
Health status fair			-0.063 (0.033)					-0.071 (0.034)*
Health status poor			-0.141 (0.088)					-0.107 (0.089)
Education 1 (reference = education 6)				-0.236 (0.227)				-0.148 (0.227)

	Model 0 null	**Model 1 age**	**Model 2 health**	**Model 3 education**	**Model 4 sex**	**Model 5 ethnicity**	**Model 6 urbanization**	**Model 7 full**
Education 2				0.119 (0.107)				0.120 (0.108)
Education 3				0.006 (0.040)				0.001 (0.040)
Education 4				-0.006 (0.069)				0.010 (0.069)
Education 5				0.078 (0.042)				0.067 (0.042)
Education 7				0.066 (0.035)				0.093 (0.036)*
Education 8				0.042 (0.028)				0.033 (0.028)
Education 9				0.049 (0.039)				0.050 (0.040)
Education 10				-0.015 (0.066)				-0.021 (0.066)
Sex (reference = male)					0.007 (0.021)			0.012 (0.021)
Ethnicity (reference = Dutch)						-0.109 (0.047)*		-0.087 (0.047)
Urbanization 1 (reference = urbanization 5)							-0.048 (0.035)	-0.042 (0.036)
Urbanization 2							-0.013 (0.033)	-0.008 (0.033)
Urbanization 3							0.029 (0.034)	0.029 (0.034)
Urbanization 4							0.020 (0.034)	0.021 (0.033)
Variance consumers	0.253 (0.007)*	0.251 (0.007)*	0.251 (0.007)*	0.252 (0.007)*	0.253 (0.007)*	0.252 (0.007)*	0.252 (0.007)*	0.247 (0.007)*
Variance health plans	0.005 (0.002)*	0.004 (0.002)*	0.005 (0.002)*	0/005 (0.002)*	0.005 (0.002)*	0.005 (0.002)*	0.005 (0.002)*	0.004 (0.002)*
PCV [a]		20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	20.00%
-2 Log Likelihood	3633.824	3617.291	3620.935	3624.323	3633.720	3628.479	3627.020	3580.816
χ^2 [b]		16.53*	12.89*	9.50	0.10	5.35*	6.80	53.01*
Δdf		6	4	9	1	1	4	25
ICC [c]	0.019	0.016	0.020	0.019	0.019	0.019	0.019	0.016

	Model 0 **null**	**Model 1** **age**	**Model 2** **health**	**Model 3** **education**	**Model 4** **sex**	**Model 5** **ethnicity**	**Model 6** **urbanization**	**Model 7** **full**
Reimbursement of claims (N=7,359)								
Intercept	3.663 (0.025)*	3.627 (0.027)*	3.668 (0.027)*	3.643 (0.028)*	3.690 (0.025)*	3.674 (0.025)*	3.692 (0.027)*	3.675 (0.032)*
Age 18-24 (reference = 35-44)		-0.109 (0.029)*						-0.111 (0.029)*
Age 25-34		-0.003 (0.020)						0.010 (0.020)
Age 45-54		0.034 (0.018)						0.039 (0.018)*
Age 55-64		0.080 (0.018)*						0.087 (0.019)*
Age 65-74		0.117 (0.023)*						0.127 (0.023)*
Age >75		0.145 (0.031)*						0.182 (0.032)*
Health status excellent (reference= very good)			0.046 (0.020)*					0.060 (0.019)*
Health status good			-0.005 (0.015)					-0.026 (0.015)
Health status fair			-0.037 (0.019)*					-0.077 (0.020)*
Health status poor			-0.171 (0.047)*					-0.211 (0.047)*
Education 1 (reference = education 6)				-0.177 (0.094)				-0.138 (0.093)
Education 2				0.096 (0.035)*				0.059 (0.036)
Education 3				0.073 (0.021)*				0.048 (0.021)*
Education 4				-0.026 (0.035)				-0.018 (0.034)
Education 5				0.044 (0.021)*				0.025 (0.022)
Education 7				0.018 (0.022)				0.036 (0.022)
Education 8				0.011 (0.018)				0.007 (0.018)
Education 9				-0.036 (0.026)				-0.024 (0.026)
Education 10				-0.054 (0.048)				-0.058 (0.048)
Sex (reference = male)					-0.054 (0.012)*			-0.042 (0.012)*

	Model 0 **null**	**Model 1** **age**	**Model 2** **health**	**Model 3** **education**	**Model 4** **sex**	**Model 5** **ethnicity**	**Model 6** **urbanization**	**Model 7** **full**
Ethnicity (reference = Dutch)						-0.195 (0.027)*		-0.174 (0.027)*
Urbanization 1 (reference = urbanization 5)							-0.087 (0.021)*	-0.056 (0.021)*
Urbanization 2							-0.030 (0.019)	-0.024 (0.018)
Urbanization 3							-0.029 (0.019)	-0.020 (0.019)
Urbanization 4							-0.008 (0.019)	-0.001 (0.018)
Variance consumers	0.261 (0.004)*	0.258 (0.004)*	0.260 (0.004)*	0.259 (0.004)*	0.260 (0.004)*	0.259 (0.004)*	0.260 (0.004)*	0.253 (0.004)*
Variance health plans	0.015 (0.005)*	0.015 (0.004)*	0.015 (0.004)*	0.016 (0.005)*	0.015 (0.004)*	0.015 (0.004)*	0.015 (0.004)*	0.014 (0.004)*
PCV [a]		0.00%	0.00%	6.67%	0.00%	0.00%	0.00%	6.67%
-2 Log Likelihood	11061.850	10976.020	11034.490	11025.940	11042.180	11010.020	11042.290	10828.090
χ^2 [b]		85.83*	27.36*	35.91*	19.67*	51.83*	19.56*	233.76*
Δdf		6	4	9	1	1	4	25
ICC [c]	0.054	0.055	0.055	0.058	0.055	0.055	0.055	0.052

* $p<0.05$

[a] proportional Change in Variance; [b] changes in-2 Log Likelihood were calculated; significance testing with chi-square; [c] intra Class Correlation = Var health plans / (Var health plans + Var consumers)

The categories with the second most respondents were chosen as reference categories; Regression coefficients were estimated (standard errors in parentheses); The number of respondents differed across the four outcome variables, due to the fact that certain questions in the questionnaire were not applicable to all consumers.

Table 2.4 Changes in ranking of health plans in different multilevel models compared to a model without any adjustments (null model) and Kendall's τ coefficients

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Star ratings global rating health plan:							
1 remains 1	8	9	9	9	9	8	7
2 remains 2	6	11	9	11	11	10	6
3 remains 3	7	7	7	7	7	7	7
1 becomes 2	1	0	0	0	0	1	1
2 becomes 1	4	0	1	0	0	1	4
2 becomes 3	1	0	1	0	0	0	1
3 becomes 2	0	0	0	0	0	0	0
Kendall's τ coefficient:							
Global rating health plan	0.81**	0.99**	0.81**	0.98**	0.98**	0.93**	0.81**
Conduct of employees	0.89**	0.97**	0.96**	0.98**	0.97**	0.96**	0.80**
Health plan information	0.90**	0.89**	0.94**	0.98**	0.93**	0.92**	0.81**
Reimbursement of claims	0.93**	0.98**	0.95**	1.00**	0.98**	0.96**	0.91**

** $p<0.01$

Impact factor analyses

Table 2.5 shows the impact factors of all consumer characteristics. Age had an impact factor of 6.31 on global rating of health plans and 2.56 on conduct of employees, implying that the age effect on the former outcome is 2½ times its effect on the latter. Education showed an impact factor of 2.05 on global rating of health plans. No other consumer characteristic showed an impact factor of at least 1 on any outcome variable. Again, age and education seemed most important as case-mix adjusters.

Table 2.5 Heterogeneity, predictive power, and impact factor of the six consumer characteristics for the four outcome variables*

	age	health	education	sex	ethnicity	urbanization
Heterogeneity [a]						
Global rating health plan	0.052	0.030	0.123	0.050	0.035	0.153
Conduct of employees	0.051	0.032	0.097	0.042	0.040	0.138
Health plan information	0.048	0.017	0.113	0.049	0.009	0.124
Reimbursement of claims	0.063	0.026	0.096	0.059	0.035	0.136
Predictive power						
Global rating health plan	0.051	0.007	0.007	0.000	0.000	0.001
Conduct of employees	0.023	0.011	0.002	0.001	0.008	0.001
Health plan information	0.002	0.005	0.000	0.000	0.001	0.000
Reimbursement of claims	0.011	0.006	0.001	0.001	0.005	0.001
Impact factor						
Global rating health plan (RF=0.420) [b]	6.314	0.500	2.050	0.000	0.000	0.364
Conduct of employees (RF=0.458) [b]	2.561	0.769	0.424	0.092	0.699	0.301
Health plan information (RF=0.700) [b]	0.137	0.121	0.000	0.000	0.013	0.000
Reimbursement of claims(RF=0.696) [b]	0.996	0.224	0.138	0.085	0.251	0.195

[a] Both between plan and within plan variance were estimated for each characteristic in linear mixed models by 'intercept variance' and 'residual variance' respectively. The consumer characteristic of interest was the dependent variable and the data were permitted to have a correlated and non-constant covariance matrix.

[b] The Rescaling factor (RF) was calculated based on the variance of each outcome variable. The numerator of the RF is the variance of the aggregated mean on the outcome variable. The denominator of the RF is the variance of the unstandardized predicted value in a linear regression model with all consumer characteristics and dummies for health plans included on the same outcome variable.

* The core model assumptions such as linearity and distributions in the impact factor analysis are the same as for traditional linear regression models. The impact factor approach assumes that missing-data mechanism is missingness-at-random given available variables and that using health-plan dummies or so-called fixed effects effectively addresses health-plan variability.

Discussion

This study aimed to investigate the usefulness of multilevel regression for detecting case-mix adjusters of consumer experience data, in comparison to the commonly used impact factor analysis. Both multilevel regression and impact factor analyses of consumer experiences with Dutch health plans showed that age and education were the most relevant adjusters. Overall, case-mix adjustment did not have substantial impact on the ranking of most health plans and the distribution of star ratings. Nonetheless, using both statistical methods, it was shown that age and education slightly affected differences between health plans.

Although in this study both methods yielded similar results, the multilevel regression approach should be preferred on several statistical and practical grounds. First, given the hierarchical structure of consumer assessment data and the aim of institutional profiling, the multilevel regression approach is needed to handle the within-group clustering (Zaslavsky, 2007; Normand and Shahian, 2007; Daniels and Gatsonis, 1999; Gelman and Hill, 2007; Snijders and Bosker, 1999). The traditional linear regression used in the impact factor analysis assumes independence of consumer experience observations. This leads to biased standard errors used in the hypothesis testing of the main effects of the potential case-mix adjusters. The use of dummies for the groups (health plans) does not solve the failure of the independence assumption here. This can lead to biased differences in provider ratings and effects of case-mix adjusters (Normand and Shahian, 2007; Daniels and Gatsonis, 1999; Gelman and Hill, 2007).

Second, impact factor analysis becomes increasingly inefficient when large numbers of group units are involved, because it uses many dummy variables to adjust for group effects. In this study, 26 (= 27 - 1) health plan dummies were used in the impact factor analysis. In larger studies, such as a planned CQ-index measurement of more than 4,000 family practices, using a large amount of provider dummies is undesirable as it leads to inefficiency and model instability.

Third, unlike in the traditional regression of impact factor analysis, multilevel regression estimates are ‘shrunken’ toward the population mean and give more precise and accurate predictions (Snijders and Bosker, 1999). This guards against extreme values from small numbers of cases within particular providers. Fourthly, the multilevel regression method is less labor intensive than the impact factor analysis. Finally, multilevel analysis enables us to detect effects of adjustment on ratings themselves, as was done in this study for star ratings. After all, this is the information presented to consumers.

Concerning case-mix adjustment in general, we believe efforts should be made to ensure that performance scores reflect health plans’ actual performance, and not compositional issues arising from their differential consumer profiles. Given a healthcare market in which healthcare plans and providers are held accountable for their performances, even seemingly small adjustments are important for fair comparisons. Although we had no information on other characteristics than the self reported characteristics under consideration, we recognize that other factors, such as disease status and severity, comorbidities, and prior healthcare utilization, might be more predictive and should be investigated in future research (O'Malley et al., 2005). For example, administrative claims data could be tested to assess the effect of expected use of healthcare. However, variables like healthcare utilization should not always be adjusted for, because health plans might influence utilization through regulating access to healthcare. The aim of case-mix adjustment in CQ-index measurements is not to explain differences between healthcare plans or providers, but to ensure fair comparisons. Statistical adjustment should therefore only be conducted after careful theoretical and policy considerations, and only for variables that plans or providers cannot influence themselves (Zaslavsky, 1998; Iezzoni, 1997).

If there is any suspicion that a case-mix adjuster also adjusts for systematic differences in the quality of services that different consumer groups receive, it is better to refrain from such adjustment, and to present unadjusted data for these groups separately instead or to search for other methods. In this respect, it may be worthwhile to explore the possibility of using anchoring vignettes for the 'calibration' of responses as an alternative for case-mix adjustment (King et al., 2003). Meanwhile, we argue that properties of the multilevel regression method make it an appropriate tool for examining both case-mix adjustment and performance analysis of consumer experience data, especially given the clustered, frequently unbalanced, and sometimes sparse nature of such data.

3

Differences between family practices in the influence of patient characteristics on healthcare experiences

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Introduction

Patients' evaluations of healthcare quality have become a central part of provider profiling in many countries. Recently, progress has been made in standardizing patient experience measurements, specifically the survey and data collection methods. Some key initiatives are CAHPS (Consumer Assessment of Healthcare Systems and Providers) in the United States, patient surveys by the Picker Institute in the United Kingdom, the National Danish Survey of Patient Experiences and the Dutch Consumer Quality Index (CQ-index or CQI). Data collection typically generates a vast amount of quality information for different healthcare sectors. The information consists of patient experiences for a variety of aspects (e.g. healthcare professionals' conduct and communication, information provision, accessibility), and global evaluations of received healthcare. The results are then presented in the form of comparative performance information about providers for public reporting purposes.

To ensure fair comparisons of healthcare providers or plans, it is recommended that ratings are adjusted for the influence of case mix (Welch, Black, and Fisher, 1995; Iezzoni, 1997). Ratings are frequently adjusted for respondents' age, sex, self-rated health status and education because these characteristics are associated with reported experiences (Zaslavsky et al., 2001; O'Malley et al., 2005; Huang et al., 2005). For example, patients with low levels of education generally report more positive experiences than patients with relatively high levels of education. Although the overall influence of case-mix adjusters on patient experiences is usually limited (O'Malley et al., 2005; Damman et al., 2009), it can make a large difference for providers with atypical patient populations.

The influence of patient characteristics on CQI ratings has been investigated using multilevel regression analyses (Stubbe, Gelsema, and Delnoij, 2007; Damman et al., 2009). Multilevel modeling is considered an appropriate method for analyzing institutional performance because it takes into account data clustering (patients within providers) and allows the estimation of between-provider variance (Goldstein and Spiegelhalter, 1996; Christiansen and Morris, 1997; Merlo, 2005; Zaslavsky, 2007; Arling et al., 2007). One important advantage of the multilevel method for case-mix adjustment is that the influence of patient characteristics can be detected at the provider level (Damman et al., 2009). Up to now, the influence of case-mix was controlled by fitting models in which the effects of patient characteristics were not allowed to vary across providers. In statistical terms, we have used multilevel models with random intercepts and fixed effects for the covariates.

This method seems appropriate when the influence of patient characteristics reflects differences in systematic response bias, such as the fact that patients with lower levels of education always rate their experiences more favorably than patients with higher levels of education, or when real differences in healthcare experiences show similar patterns for different healthcare providers (Zaslavsky, Zaborski, and Cleary, 2000). However, it may also be that patient subgroups' experiences vary across providers. For example, patients with little education may be more positive about provider A than patients with high levels of education but more negative about provider B. In this case, it is debatable whether ratings should be corrected for differences in patient characteristics as variability can imply differential provider behavior towards patient subgroups. An important disadvantage of the usual method is that the more patient characteristics we adjust for, the more the information is presented for the 'average healthcare consumer'. We know, however, that people prefer to see healthcare evaluations of 'people like me', similar with regard to age, geographic area, household composition and socioeconomic status (Hibbard, Slovic, and Jewett, 1997; Edgman-Levitan and Cleary, 1996; Lubalin and Harris-Kojetin, 1999). Such targeted information can increase the relevance of the information and may facilitate consumers' use of it. If the influence of case-mix adjusters differs across providers, this may be a reason to present information for patient subgroups (also called 'stratified reports'). Therefore, it is important to know whether patient characteristics' influences are similar across healthcare providers.

The heterogeneity of case-mix associations was investigated in previous studies of CAHPS data and other patient experience measures in the United States. These studies showed between-health plan and between-provider variability in the effects of age, health status, race/ethnicity, education and language (Zaslavsky, Zaborski, and Cleary, 2000; Elliott et al., 2001; Lurie et al., 2003; Rodriguez et al., 2008; Elliott et al., 2009). However, these studies did not systematically investigate methods for predicting actual provider ratings if effects vary across providers. More specifically regarding the Dutch situation, in which healthcare providers are currently monitored for public reports, it remains largely unclear which case-mix adjustment method should be performed.

Previous studies also did not systematically examine patient subgroups' evaluations of family practice care per provider, though we might expect substantial variability when there is personal provider-patient contact. Communication between the family practitioner and the patient is an important aspect of family practice care. Studies have shown a relationship between patient characteristics on the one hand and patient preferences for communication styles on the other hand. More specifically, age (Krupat et al., 2001; Swenson et al., 2004), education (Krupat et al., 2000; Krupat et al., 2001; Parker et al., 2001; Benbassat, Pilpel, and Tidhar, 1998; Swenson et al., 2004), sex (Krupat et al., 2001), general health status (Degner and Sloan, 1992; Krupat et al., 2001; Benbassat et al., 1998), mental health status (Graugaard and Finset, 2000), ethnicity (Curtis et al., 2000; Krupat et al., 2001), SES (Krupat et al., 2001; McKinstry, 2000) and being in employment (Dowsett et al., 2000) have been cited as characteristics of importance. In general, patients who are younger, more highly educated or female, who have a good medical prognosis or who belong to ethnic majorities prefer more patient-centered communication styles. These styles include attention to psychosocial needs, disclosure of patients' concerns, conveying a sense of partnership and involvement in decision making (Bensing, 2000).

Some patients may, however, prefer physicians who take a more directive approach (Swenson et al., 2004; Schwartz et al., 2006; Krupat, 2006; De Haes, 2006). In addition, information provision may elicit different preferences across patient subgroups (Greene and Adelman, 2003). Some patients do not want to be fully informed, for example patients in poor general health (Hagerty et al., 2004; Leydon et al., 2000) or poor mental health (Hagerty et al., 2004). Jansen et al. (2007) showed that older cancer patients are less interested in information details than younger patients. Physicians may adapt their behavior to the specific person they are attending to (Krupat, 2006; Schwartz et al., 2006). Depending on the patient's situation, physicians may use particular communication styles or provide more or fewer information details. When we examine patient experiences, it is therefore important to consider that these experiences may be, in part, a result of the physician-patient interaction.

Given the arguments described above, it is necessary to carefully check for between-provider variability in case-mix influences in patient experience measurements, especially where evaluations of healthcare professionals are concerned. The primary aim of the present work was to investigate the influence of patient characteristics on experiences with healthcare across Dutch family practices. For this purpose, multilevel random effects analyses were performed. These analyses allow the influence of covariates to vary across the 'higher level units' (family practices). Our secondary aim was to generate exemplary comparative healthcare information using these random effects analyses. The research question was: *"Are the effects of patients' characteristics on experiences with healthcare similar across family practices participating in the CQI Family Practice Survey?"*

New contribution

Two elements of the present study add to previous work on the heterogeneity in the relationship between patient characteristics and experiences. First, where previous studies only assessed the heterogeneity of case-mix influences across providers (Zaslavsky, Zaborski, and Cleary, 2000; Elliott et al., 2001; Rodriguez et al., 2008; Elliott et al., 2009), we also calculated predicted performance scores using a model that included this heterogeneity. To this end, we employed a multilevel random effects model (Snijders and Bosker, 1999) to assess case-mix variability and we adopted a Bayesian approach to predict stratified comparative provider scores from this model. Second, as far as the authors are aware, this is the first study to address heterogeneity of case-mix influences across providers in family practice care. While it is true that the consistency of case-mix effects across primary care providers has been examined (Rodriguez et al., 2008), these analyses were limited to ethnic characteristics and the issue of heterogeneity was not linked to case-mix adjustment of comparative healthcare information. In short, our study tries to replicate and extend previous findings from the United States to the Dutch context of comparative healthcare information, thereby focusing on a number of patient characteristics and on actual stratified family practice ratings.

Conceptual framework

We build on the theoretical framework for case-mix adjustment of patient experience data, which states that adjustment is important when 1) outcomes are related to patient characteristics; 2) the distribution of the characteristics is different for different providers (Zaslavsky, 2001). The aim of case-mix adjustment is to eliminate systematic response bias from comparative performance ratings (Elliott et al., 2001). It is generally acknowledged that differences in systematic response bias should be separated from actual differences in the treatment patients receive (Zaslavsky, 2001; Elliott et al., 2001; Elliott et al., 2009). When there is case-mix variability across providers, it is more likely that differences in quality of care are concerned than systematic response bias. Another basis for our conceptual framework is the assumption that both patients' preferences for provider behavior and providers' behavior per patient subgroup may vary, and that these factors will shape patient experiences. Individuals may differ in their preferences depending on their demographic background and character. Ideally, healthcare professionals do not display one single style of behavior, but adapt to the preferences of patient subgroups. In this ideal relationship, subgroups of patients would report equally positive experiences with the same provider. However, professionals may differ in their ability to use multiple behavior styles. These assumptions draw on the concepts of patient-physician fit and relationship-centered care (Krupat, 2006;

Schwarz et al., 2006), where the patient and physician are seen as a pair constituting the unit of analysis.

Methods

Participants

We used data from the CQI Family Practice survey, which was disseminated among 11,637 people in 2007. These people were all registered with a family practice, like all non-institutionalized inhabitants of the Netherlands, irrespective of whether they are ill or not. In the Dutch healthcare system, family physicians function as gatekeepers to specialist and hospital care. The 11,637 people had all had at least one contact with their family physician during the past 12 months. A total of 6,764 persons (58%) responded. We excluded 1,291 respondents because their family practice was unknown (n=147), the questionnaire was completed by someone else than the addressed person (n=600), they filled out less than half of the core items (n=359), or they had missing values for the case-mix adjusters (n=185). For the current study we analyzed the experiences of 5,473 people within 32 family practices. The number of respondents per practice varied from 125 to 224.

Measurement

The CQI Family Practice survey is a questionnaire developed and tested in 2007 (Meuwissen and De Bakker, 2008). The pilot questionnaire contained 82 items, of which 59 focused on patient experiences with healthcare provided by the family practice. Other questions were skip items (items screening the eligibility of respondents to answer items and instructing them to skip items; 5 items), global ratings of the family practice (3 items), items on socio-demographic characteristics (10 items), items on patients' empowerment (3 items), one item on the family physician's sex, and one item assessing assistance with filling out the questionnaire. Several composite scores were formed to cover various quality dimensions of family practice care. The questionnaire showed good psychometric properties and respectable internal reliability of the composite scores (Cronbach's alpha varying from 0.70 to 0.90).

Statistical analyses

For the current analyses, we considered five outcome measures of the questionnaire: four composite scores and one global rating (Table 3.1).

Table 3.1 Outcome measures

Variable	**Number of items**	**Items**	**Response categories**	**Cronbach's alpha**
Family physician's respectful treatment	4	How often did your doctor listen carefully to you? How often did your doctor treat you seriously? How often did your doctor treat you with respect? How often did your doctor spend enough time with you?	Never (1); Sometimes (2); Usually (3); Always (4)	α= 0.85
Practice assistant's communication *	6	How often were the doctors and other practice staff ready to help? When you phoned the family practice during regular office hours, how often did you get the help you needed? How often was it a problem for you to tell your story to the practice assistant, before you could speak to the doctor? How often did the practice assistant rightly decided that you needed an appointment with the doctor? How often did the practice assistant treat you with respect? How often did the practice assistant spend enough time with you?	Never (1); Sometimes (2); Usually (3); Always (4)	α=0.75
Tailored care	9	How often were you informed about different treatment options? How often did you get the chance to decide about your treatment? How often did the doctor describe possible side effects of prescribed medicine? How often did the doctor explain why it was important to follow his/her instructions or advice?	Never (1); Sometimes (2); Usually (3); Always (4)	α=0.88

- table 3.1 continues -

- table 3.1 continued -

Variable	Number of items	Items	Response categories	Cronbach's alpha
		How often did you get enough assistance to find your way around the healthcare system? How often did your doctor cooperate well with other healthcare professionals? How often did your doctor pay attention to possible emotional problems that were related to your health? How often did your doctor help you to prevent diseases or to improve your health? How often did the doctor's treatment reduce your health problems?		
Accessibility of care	5	How often did you get to speak to someone from the family practice by phone within one minute? How often were you admitted to the practice's consultation session within 24 hours when you thought you needed it? How often did you have to try too hard to get admitted to the practice's consultation session? How often did you get an appointment with your own doctor within reasonable time? How often did you see your doctor within 15 minutes of your appointment time?	Never (1); Sometimes (2); Usually (3); Always (4)	α=0.70
Global rating of the family physician	1	Using any number from 0 to 10, where 0 is the worst doctor possible and 10 is the best doctor possible, what number would you use to rate your family physician?	0 to 10	-

* The profession of practice assistant is a profession closely related to that of a practice secretary or a practice nurse.

We analyzed between-practice variability in case-mix effects by fitting random slope models, using multilevel linear regression analyses with random intercepts in MLwiN. These models (also called random effects models) allow the effects of independent variables to vary across providers (Rasbash et al., 2004). We assessed the influence of the following characteristics, commonly recognized as important case-mix adjusters (Zaslavsky et al., 2000; O'Malley et al., 2005; Eselius et al., 2008): age, educational level, sex, self-reported general health status, self-reported mental health status and ethnicity. First, we tested a model with random intercepts without explanatory variables (baseline model). Second, models including one patient characteristic each were fitted, with fixed slopes for the patient characteristics (a-models). Third, we allowed the slopes in the models to vary (b-models). To test the variability of case-mix effects, we assessed the variance of the slopes (σ^2) in the b-models.

To illustrate what actual stratified reports would look like in the event of heterogeneity across providers, we predicted practices' scores for three standard values of the covariate age: as if all respondents for all practices had an age of x1 an age of x2 or an age of x3. As stated above, the effect of the covariate age was allowed to vary across providers in these analyses. Therefore, if there were substantial differences between providers A and B in the effect of the covariate, it would be possible for provider A to perform better than provider B when predicting scores for age x1, but vice versa when predicting scores for age x2. In a specific example, scores for the outcome 'family physician's respectful treatment' were assessed using three random slope models based on Empirical Bayes shrinkage. Each model resulted in mean scores with comparison intervals for each practice. We used the comparison intervals to create star ratings for the practices, reflecting relative performance (Goldstein and Healy, 1995). Practices received one star (worse than average) when their comparison interval was below the overall mean score across all practices, two stars (average) when the interval crossed the mean score, and three stars (better than average) when the interval was above the mean score. In the statistical package we used (MLwiN), provider scores and comparison intervals are usually calculated for the value 0 or the mean of the covariate. Instead of this, we used three standard values to create information for specific age categories. The calculations consisted of subtracting three different constants (a) from the covariate age (x' = x – a), namely the category levels corresponding to a = 15-25 years , a = 46-65 years and a = 75 years and older (compare centering techniques; Enders and Tofighi, 2007).

Results

Respondents' characteristics

Of all respondents, 8% was younger than 25, 31% was aged between 25 and 44, 37% between 45 and 64, 13% between 65 and 75, and 11% was older than 75. More respondents were female (63%) than male (37%), and the majority had a Dutch background (82%). Of the first and second generation immigrants, 11% were migrants from non-Western countries and 7% were migrants from Western countries. More than half (52%) of the respondents had a low level of education, 29% had an average level of education, and 19% was highly educated. Nearly 17% rated their general health as very good or excellent, and nearly 30% gave this rating concerning their mental health.

Influence of case-mix adjusters on patient experience (a-models)

The results of the regression models are displayed in Tables 3.2A (age, education, and sex) and 3.2B (health, mental health, and ethnicity).

Age was positively related to patients' experiences on all five outcomes, indicating that older patients reported more positive experiences than younger patients. Education showed a negative relationship (more highly educated patients reporting more negative experiences than patients with lower levels of education) for two outcomes, namely experiences with tailored care and the global rating of the family physician. Respondents' education was positively related to experiences with the practice assistant's communication. The patient's sex was related to experiences with respectful treatment by the family physician and with the accessibility of care, with men being more positive than women. A positive relationship between patients' general health status and mental health status, and their experiences (healthier people reporting more positive experiences) was found for all outcomes. Finally, ethnicity was related to all outcomes: migrants reported more negative experiences than people with an exclusively Dutch background.

Table 3.2A Random effects of case-mix adjusters compared with fixed effects; models a and b include one case-mix adjuster each [#]

	Baseline model	**Model a age**	**Model b age**	**Model a education**	**Model b education**	**Model a male** [c]	**Model b male** [c]
Family physician's respectful treatment (N=5,471)							
Intercept	3.7637	3.6369	3.6255	3.7616	3.7643	3.7309	3.7309
	(0.0174)*	(0.0299)*	(0.0460)*	(0.0212)*	(0.0250)*	(0.0238)*	(0.0238)*
β case-mix adjuster	-	0.0261	0.0289	0.0006	-0.0000	0.0241	0.0241
		(0.0050)*	(0.0074)*	(0.0035)	(0.0051)	(0.0118)*	(0.0118)*
σ^2 case-mix adjuster	-	-	**0.0009**	-	**0.0004**	-	0.0000
			(0.0004)*		**(0.0002)***		(0.0000)
ICC [a]	0.047	0.046	0.215	0.047	0.076	0.048	0.048
χ^2 [b]	-	26.819*	**17.954***	0.330	**10.506***	4.144*	0.000
Practice assistant's communication (N=5,462)							
Intercept	3.4882	3.2551	3.2428	3.4316	3.4333	3.4997	3.4993
	(0.0254)*	(0.0377)*	(0.0600)*	(0.0286)*	(0.0318)*	(0.0315)*	(0.0329)*
β case-mix adjuster	-	0.0481	0.0510	0.0163	0.0160	-0.0084	-0.0081
		(0.0058)*	(0.0086)*	(0.0041)*	(0.0050)*	(0.0137)	(0.0145)
σ^2 case-mix adjuster	-	-	**0.0013**	-	0.0003	-	0.0007
			(0.0006)*		(0.0002)		(0.0017)
ICC [a]	0.077	0.076	0.280	0.074	0.097	0.077	0.087
χ^2 [b]	-	68.132*	**25.326***	16.217*	3.774	0.375	0.281
Tailored care (N=5,317)							
Intercept	3.2021	2.8486	2.8339	3.2758	3.2779	3.1662	3.1662
	(0.0239)*	(0.0436)*	(0.0621)*	(0.0304)*	(0.0307)*	(0.0342)*	(0.0342)*

	Baseline model	**Model a age**	**Model b age**	**Model a education**	**Model b education**	**Model a male** [c]	**Model b male** [c]
β case-mix adjuster	-	0.0728	0.0764	-0.0212	-0.0217	0.0263	0.0263
		(0.0076)*	(0.0102)*	(0.0053)*	(0.0062)*	(0.0179)	(0.0179)
σ^2 case-mix adjuster	-	-	0.0015	-	0.0003	-	0.0000
			(0.0008)		(0.0003)		(0.0000)
ICC [a]	0.039	0.038	0.169	0.041	0.042	0.039	0.039
χ^2 [b]	-	91.020*	**11.520***	15.960*	1.820	2.160	0.000
Accessibility of care (N=5,332)							
Intercept	2.9952	2.6854	2.6829	3.0124	3.0138	2.8756	2.8761
	(0.0398)*	(0.0513)*	(0.0606)*	(0.0430)*	(0.0403)*	(0.0448)*	(0.0433)*
β case-mix adjuster	-	0.0640	0.0645	-0.0050	-0.0057	0.0878	0.0873
		(0.0066)*	(0.0073)*	(0.0046)	(0.0050)	(0.0155)*	(0.0155)*
σ^2 case-mix adjuster	-	-	0.0003	-	0.0001	-	0.0000
			(0.0004)		(0.0002)		(0.0019)
ICC [a]	0.144	0.148	0.225	0.145	0.126	0.143	0.132
χ^2 [b]	-	92.908*	3.417	1.156	1.630	32.041*	0.197
Global rating of family physician (N=5,415)							
Intercept	8.1363	7.0833	7.0606	8.4185	8.4233	8.1152	8.1085
	(0.0570)*	(0.0910)*	(0.1188)*	(0.0692)*	(0.0679)*	(0.0746)*	(0.0890)*
β case-mix adjuster	-	0.2173	0.2225	-0.0812	-0.0834	0.0154	0.0208
		(0.0148)*	(0.0189)*	(0.0104)*	(0.0127)*	(0.0352)	(0.0377)
σ^2 case-mix adjuster	-	-	0.00437	-	0.0017	-	0.0060
			(0.00283)		(0.0013)		(0.0113)
ICC [a]	0.059	0.059	0.159	0.063	0.060	0.058	0.100
χ^2 [b]	-	211.350*	**5.670***	60.600*	3.200	0.200	**4.280***

Table 3.2B Random effects of case-mix adjusters compared with fixed effects; models a and b include one case-mix adjuster each #

	Model a health	**Model b health**	**Model a mental health**	**Model b mental health**	**Model a migrant** [d]	**Model b migrant** [d]
Family physician's respectful treatment (N=5,471)						
Intercept	3.5405	3.5375	3.5756	3.5750	3.9496	3.9445
	(0.0267)*	(0.0396)*	(0.0263)*	(0.0350)*	(0.0246)*	(0.0207)*
β case-mix adjuster	0.0758	0.0771	0.0583	0.0584	-0.1557	-0.1493
	(0.0069)*	(0.0097)*	(0.0063)*	(0.0082)*	(0.0159)*	(0.0210)*
σ^2 case-mix adjuster	-	**0.0014**	-	0.0009	-	**0.0048**
		(0.0007)*		(0.0005)		**(0.0014)***
ICC [a]	0.046	0.174	0.047	0.128	0.038	0.00
χ^2 [b]	118.299*	**18.076***	86.036*	**8.254***	94.374*	**18.830***
Practice assistant's communication (N=5,462)						
Intercept	3.2854	3.2846	3.3330	3.3329	3.8223	3.8217
	(0.0343)*	(0.0444)*	(0.0342)*	(0.0347)*	(0.0307)*	(0.0309)*
β case-mix adjuster	0.0689	0.0694	0.0481	0.0480	-0.2798	-0.2776
	(0.0081)*	(0.0105)*	(0.0073)*	(0.0082)*	(0.0182)*	(0.0251)*
σ^2 case-mix adjuster	-	0.0014	-	0.0005	-	0.0077
		(0.0009)		(0.0005)		(0.0047)
ICC [a]	0.074	0.160	0.074	0.079	0.058	0.053
χ^2 [b]	72.661*	**7.309***	43.688*	1.285	229.555*	**8.428***
Tailored care (N=5,317)						
Intercept	2.9713	2.9690	3.0127	3.0119	3.4046	3.3955
	(0.0390)*	(0.0528)*	(0.0386)*	(0.0428)*	(0.0362)*	(0.0318)*

	Model a health	**Model b health**	**Model a mental health**	**Model b mental health**	**Model a migrant** [d]	**Model b migrant** [d]
β case-mix adjuster	0.0787	0.0796	0.0589	0.0590	-0.1696	-0.1591
	(0.0106)*	(0.0138)*	(0.0096)*	(0.0109)*	(0.0241)*	(0.0305)*
σ^2 case-mix adjuster	-	0.0025	-	0.0009	-	0.0088
		(0.0015)		(0.0009)		(0.0069)
ICC [a]	0.038	0.127	0.038	0.063	0.033	0.003
χ^2 [b]	54.510*	**8.940***	37.870*	1.200	49.160*	**13.220***
Accessibility of care (N=5,332)						
Intercept	2.8176	2.8156	2.8156	2.8156	3.2031	3.2032
	(0.0476)*	(0.0576)*	(0.0473)*	(0.0473)*	(0.0460)*	(0.0480)*
β case-mix adjuster	0.0604	0.0612	0.0557	0.0557	-0.1740	-0.1735
	(0.0092)*	(0.0116)*	(0.0083)*	(0.0083)*	(0.0211)*	(0.0237)*
σ^2 case-mix adjuster	-	0.0016	-	0.0000	-	0.0029
		(0.0011)		(0.0000)		(0.0040)
ICC [a]	0.140	0.219	0.140	0.140	0.137	0.151
χ^2 [b]	42.697*	**5.956***	45.267*	0.001	67.738*	0.841
Global rating of family physician (N=5,415)						
Intercept	7.9107	7.9099	7.8333	7.8349	8.4128	8.3993
	(0.0834)*	(00.1091)*	(0.0826)*	(0.0952)*	(0.0795)*	(00.0856)*
β case-mix adjuster	0.0766	0.0769	0.0938	0.0930	-0.2317	-0.2132
	(0.0208)*	(0.0281)*	(0.0187)*	(0.0223)*	(0.0478)*	(0.0646)*
σ^2 case-mix adjuster	-	0.0113	-	0.0046	-	0.0488
		(0.0063)		(0.0040)		(0.0311)
ICC [a]	0.058	0.142	0.057	0.097	0.055	0.068
χ^2 [b]	13.510*	**8.560***	25.030*	2.400	23.420*	**7.200***

\# The a-models are the models with random intercepts and fixed effects of the case-mix adjusters. The b-models are the models with random intercepts and random effects of the case-mix adjusters. Δdf is 1 in each model following model 0. Age, education, and the health variables were measured as categorical variables in the questionnaire. They were included as if they were continuous variables in the current analyses, to facilitate interpretation of the results. Preliminary analyses - not shown here - showed that specifying the variables as continuous accounted for a similar amount of variance as categorical specifications, which is in line with previous patient experience studies.

[β] Regression coefficient.

σ^2 Variation in the slopes across the family practices' summary lines.

* $p<0.05$.

[a] Intra Class Correlation = Var providers / (Var providers + Var consumers).

[b] Changes in-2 Log Likelihood were calculated; significance testing with chi-squared: a-models compared with the baseline model and b-models b compared with the a-models.

[c] Sex was coded as female (0) or male (1).

[d] Ethnicity was coded as being born in the Netherlands (0: Dutch origin) or not (1: migrant). The group of migrants consisted of both Western and non-Western migrants.

Variability of case-mix effects (b-models)

As can be seen from the random slope models, significant variation between the slopes for different practices was found for age, education, general health status and ethnicity. Significant differences in the effect of age appeared for two outcomes: the family physician's respectful treatment (0.0009 (s.e.=0.0004)) and communication with the practice assistant (0.0013 (s.e.=0.0006)). Significant variances for the other characteristics were only found for the family physician's respectful treatment; they varied from 0.0004 (s.e.=0.0002) to 0.0048 (s.e.=0.0014).

To illustrate significant slope variability, we plotted the slopes showing the relationship between age and experiences of the family physician's respectful treatment for the different practices. Figure 3.1 shows the slopes in the fixed slope model and Figure 3.2 in the random slope model. As can be seen in Figure 3.2, the lines converge other as age increases. In other words, there are relatively large differences between practices according to younger patients, and relatively small differences according to older patients. Furthermore, although age is positively related to experiences for most practices, some practices show a negative slope, indicating that younger patients reported more positive experiences than older patients.

Figure 3.1 The association between respondents' age and experiences with the family physician's respectful treatment: model with fixed effect of age*

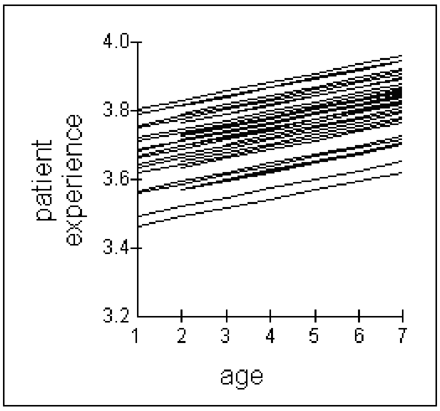
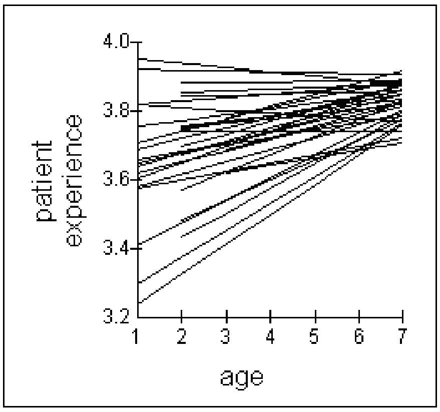


Figure 3.2 The association between respondents' age and experiences with the family physician's respectful treatment: model with random effect of age*



* Each line corresponds to one practice; the higher the patient experience, the more positive.

The graph of the random slopes for respondents' self-rated general health status is similar to that for age (Figure 3.2), except that here all the slopes are positive. The slopes for most practices in the random slope model including education are similar to the slopes in the fixed effect model. For several practices, however, education has a highly positive effect while it has a highly negative effect for other practices. The random slope model of the association between ethnicity and respectful treatment by the family physician shows a diverging pattern, indicating larger differences between practices according to migrant patients than according to patients with an exclusively Dutch ethnic background.

Effects on ratings

In Table 3.3, the shifts in family practices' star ratings for the family physicians' respectful treatment are displayed for two standard age categories in random slope models. The star ratings for these two categories are compared to that for the category of 15-25 years old. Relatively large changes in star ratings occurred in the random slope model for age 75 and older. The pattern corresponds to Figure 3.2: there are relatively small differences between practices according to older patients, reflected by many shifts to two stars.

Table 3.3 Changes in star ratings for the family physician's respectful treatment *

	Model with reference value of 46-65 years	Model with reference value of 75 years and older
1 star remains 1 star	7	3
2 stars remain 2 stars	13	13
3 stars remain 3 stars	7	1
1 star becomes 2 stars	1	5
1 star becomes 3 stars	-	-
2 stars become 1 star	1	1
2 stars become 3 stars	2	2
3 stars become 2 stars	1	6
3 stars become 1 star	-	1

* The changes in star ratings are the changes in the random slope models with different reference values for age compared with the model with a reference value of 15-25 years.

Discussion and conclusion

The purpose of this study was to explore potential variability in case-mix effects on patient experiences across family practices. Using multilevel random effects analyses of patients' age, education, sex, general health status, mental health status and ethnicity, we found little case-mix variability overall. However, some variability was found for the family physician's respectful treatment and communication with the practice assistant. Communication measures, which deal with how healthcare professionals behave, constitute key measures in patient experience research. This means that case-mix variability can be an influential phenomenon, and that traditional case-mix corrections using fixed slopes are not necessarily appropriate. Multilevel random effects regression has proved to be an effective method to check for systematic differences in patient subgroup experiences across providers, and it is a promising method for predicting stratified relative performance ratings. Considering the advantages of the multilevel method applied (e.g. relatively unbiased standard errors, precise measurement, efficiency), random effects analyses seem a valuable option for the future measurement of patient subgroup experiences.

Study limitations

Some key limitations should be mentioned. In the current context of patient experience data, the limited numbers of observations in several categories are a methodological problem. The 'lower' categories for the variables age, general health status, and mental health status, (younger people and people reporting poor health) contained relatively few cases. Furthermore, 400 questionnaires were sent for each practice in the pilot study. Because of the relatively good discriminative power of the survey, in the future only 150 to 200 questionnaires will be sent. This means that there will be even less respondents in the various subgroups. For ethnicity, this problem occurred for several family practices; practices in more rural regions of the Netherlands had hardly any migrants on their list. The slopes of some practices are therefore based on a small number of observations. In addition, answers to some of the questionnaire items (on which the composite scores were based) were slightly skewed, with relatively few people reporting negative experiences. For current purposes, these methodological issues are not that important because our aims were to explore and illustrate case-mix variability. In addition, the multilevel method used deals appropriately with small numbers of cases through 'shrinkage' to the population mean (Snijders and Bosker, 1999; Zaslavsky, 2001). However, in the context of public performance data, these limitations should be carefully considered (Zaslavsky, 2001).

Discussion

In line with previous studies (Elliott et al., 2001; Zaslavsky et al., 2001; O'Malley et al., 2005), a relationship was found between patient characteristics and reported experiences. Older people, men, healthier people and people born in the Netherlands generally reported more positive experiences. The effect of education was different for different outcomes. A higher level of education was, as expected (Elliott et al., 2001; Zaslavsky et al., 2001; O'Malley et al., 2005; Damman et al., 2009), negatively related to two outcomes, namely tailored care and the global rating of the family physician. However, more highly educated patients were more positive about communication with the practice assistant than people with lower levels of education. It might be that more highly educated patients have a better understanding of the division of tasks between physicians and their assistants.

Significant variation between practices in the effect of case-mix variables was found for age, education, general health status and ethnicity, which also corresponds to findings from previous studies (Elliott et al., 2001; Lurie et al., 2003; Rodriguez et al., 2008; Elliott et al., 2009). The 'standard' response bias (older, healthy people born in the Netherlands and with lower levels of education reporting more positively) was not shown by all practices, nor was the size of the effects consistent across practices. These variations suggest that patient subpopulations as defined by age, education, health and ethnicity experience real differences in healthcare from different providers. The significant slope variances were all found for themes related to healthcare professionals' conduct, such as listening carefully, treating the patient with respect and spending enough time with the patient. This is also consistent with the findings of previous studies, in which heterogeneity of case-mix relationships across providers was mainly found for communication-related measures (Rodriguez et al., 2008; Elliott et al., 2009). Variable patient subgroup experiences across providers thus mainly relate to what happens in personal encounters between patients and professionals. The fact that Zaslavsky, Zaborski, and Cleary (2000) did not find variability further underlines the eminence of healthcare professionals' conduct. The contact between health plan employees and the insured is clearly different from that between healthcare professionals and patients.

An obvious explanation for the variation in case-mix variables' effects on conduct-related outcomes is the differential communication styles of professionals. It seems that there are differences between family practices in the fit between patients and professionals: in some practices in this study there is a better fit than in other practices. We know that particular patient subgroups, such as younger, more highly educated patients tend to prefer patient-centered communication styles (Krupat et al., 2001; Swenson et al., 2004). In a few family practices in this study, more positive experiences with the physician's respectful treatment were found among younger patients than among older patients. It could be that patient-centered communication styles are particularly dominant in these practices. However, we did not find differential subgroup experiences across practices concerning tailored care, though this aspect also concerns patient-centered communication. More research should be performed on the difference between what we have called professionals' *conduct* and *tailored care,* and more particularly on how patients view or evaluate these aspects.

When considering stratified reports for age, we found different star ratings for different age categories. Both the variability of case-mix effects and these different star ratings for patient subgroups imply that we should carefully consider case-mix adjustment methods when generating comparative information. Our study illustrates that, at least where conduct-related aspects are concerned, more than simply systematic response bias needs to be taken into account in patient experience measurements. In particular, younger people, people with low levels of education and those with high levels of education, people in poor health and migrants could benefit from stratified reports displaying performance for their subpopulation. This could be more informative than standard case-mix adjusted information.

Implications

Our results have several implications for researchers engaged in patient experience surveys. Multilevel regression modeling with random effects for patient characteristics should be a standard part of pilot testing for surveys. Random slope analysis is a relatively simple method (supplementary to multilevel fixed slope analysis) to check for systematic differences in the experiences of patient subgroups across healthcare providers. When significant and systematic case-mix effect variability occurs for particular outcomes in the survey, standard case-mix adjustment using fixed effects might not be appropriate for public comparative healthcare information. Researchers and relevant stakeholders should then decide whether it is necessary to apply other (additional) methods. For example, stratified reports can be displayed for patient subgroups using multilevel regression with random effects for patient characteristics. As argued, there are some methodological issues intrinsic to the type of data we are dealing with that should be overcome before using these analyses for public comparative information. Another random effects approach might be to use multilevel regression with random effects dummy variables included for all adjusters' categories (instead of all but one category). These analyses provide more reliable standard error estimation than the random slope analyses with linear effects, which solves some of our methodological problems. However, such a procedure then leads to practical problems, for instance the likelihood that specific subgroup samples will be too small.

Sampling would have to be designed to select disproportionate numbers of respondents from particular demographic groups, which is expensive and time-consuming. Stakeholders should consider the desirability of such efforts in relation to the aims of case-mix adjustment. Two general aims should be considered: (1) the aim to create fair comparisons between providers; and (2) the aim to create relevant and useful comparative information for consumers.

For researchers in this field it may also be worthwhile to look into a completely different method for case-mix adjustment, namely the use of more direct measures of systematic response bias than patient characteristics. For example, the use of anchoring vignettes to identify reporting tendencies might be an alternative. Patient experiences are then analyzed using regression models with corrections for patients' responses to vignettes (King et al., 2004). The advantage is that systematic response bias is filtered out, while real differences remain intact. More research is needed to assess the methodological benefits and practical implementation of this approach.

4

An international comparison of Web-based reporting about healthcare quality: content analysis

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Introduction

Public reporting of comparative healthcare information has become increasingly important in several countries. Comparative healthcare information is information by which consumers can make explicit comparisons between the performances of healthcare providers or health plans, in order to make an informed choice. In the United States and the United Kingdom, efforts to make this kind of information publicly available have been ongoing for about fifteen years. The aims are to increase public accountability and to support consumer choice in healthcare, and indirectly to improve the quality of health services. Healthcare policy in the Netherlands currently focuses on transparency as well: healthcare consumers are encouraged to make use of public comparative information about healthcare services and quality (Maarse and Ter Meulen, 2006; Lako and Rosenau, 2009). Dutch consumers have been provided with public reports of healthcare information in newspapers and magazines since the late 1990s. In addition, comparative healthcare information has been published on the Internet in the Netherlands for the past few years.

The number of websites containing comparative healthcare reports is rapidly growing worldwide. This number will continue to rise given the increased tendency of many healthcare systems to become publicly accountable and to use market-based approaches. In addition, existing websites likely will offer more different types of information as well as information about different healthcare sectors, in order to support consumers' decision making. When we look at various websites, no standard approaches for presenting the information seem to emerge. Carlisle (2007) considered ten American websites and concluded that *"each is unique in presentation of grades and how the grades are tabulated"*. However, based on laboratory studies on human decision making, it is known that information presentation formats influence consumers' responses (Bettman and Kakkar, 1977; Payne, Bettman, and Johnson, 1993). Therefore, it is necessary to reflect on and learn from the used presentation approaches used in different countries within the rapidly growing movement of public healthcare reporting.

In fact, presentation formats of comparative healthcare information have been steadily gaining attention. Poor information presentation is frequently cited in the literature as one reason that this kind of information is rarely used by consumers (Vaiana and McGlynn, 2002; Hibbard, 2003; Fung et al., 2008). Despite several years of international experience, there is little evidence that healthcare reports support consumer decision making (Marshall et al., 2000; Farley et al., 2002a; Farley et al., 2002b). Many researchers have suggested that the information is too complex for consumers and is not adjusted to consumers' cognitive processing and decision making strategies. In a recent review, Fung and colleagues (2008) concluded that *"Despite its theoretical appeal, making public reporting work requires successfully addressing several challenges, most notably designing and implementing a reporting system appropriate for its purpose"*.

One of the difficulties that consumers may face is the large amount of information on Web pages, which is often overwhelming (Peters et al., 2007a). It is known that consumers can only process a few 'chunks' of information simultaneously (Slovic, 1982), and are easily overloaded by information (Keller and Staelin, 1987; Hibbard et al., 1998). Consumers' attitudes toward the amount of information on websites are somewhat mixed: higher numbers of features on websites have been associated with both positive (Wells and Chen, 2000; Coyle and Thorson, 2001) and negative (McMillan, Hwang, and Lee, 2003) attitudes. In this context, the number of different types of information and the structure in which these are presented are important (Harris-Kojetin et al., 2001).

With respect to public comparative healthcare information, Van Loon and Tolboom (2005) defined three different information types. The first type is information about healthcare provider characteristics and services. This is factual information about providers' names, addresses and the geographic region in which healthcare is provided, as well as information about type of provider, provided specialties, facilities, religion, costs, and waiting times. The second information type is quality information based on performance indicators, usually derived from existing provider registrations or registrations established for public reporting purposes. These concern medical and healthcare performance information based on relatively factual information, such as the number of patients with pressure wounds or the number of operations of a particular type. The third information type is quality information based on healthcare user experience. Like the second type, this information type concerns healthcare performance. However, the data are not derived from provider registrations but from (standardized) patient surveys. For example, patients or clients are surveyed about their experiences with the treatment in the hospital or about their satisfaction with the food or privacy in the nursing home. Within each of the three types of information, several subtypes can be distinguished as well, such as general quality indicators and more specific underlying aspects of care.

Using different information types and various indicators to make a decision is known to be a difficult cognitive process (Payne, Bettman, and Johnson, 1993;

Hibbard and Peters, 2003). Moreover, as the amount of information on a Web page increases, a simple information structure combined with high usability is, almost inevitably, not attainable. Apart from the fact that more information types will increase the amount of information, presenting different information types can be complex in itself. For example, it is a complex task for consumers to make a choice when a healthcare provider performs well on one specific quality aspect, but badly on another aspect. It can become even more complex when indicators stemming from different information types are contradictory although they concern the same aspects of care. This can be the case when quality information is drawn from both hospitals' administrative records and patient surveys. A hospital's registration may indicate, for example, that patients have the opportunity to participate in the decision for a particular type of anesthetic. This would be reflected by the score 'yes' on the quality indicator 'patient participation in choice for anesthetic'. Despite this, results of a patient survey may show that patients reported negative experiences concerning participation in decision making. For example, if patients at a particular hospital were more negative compared with patients at other hospitals, the first hospital's performance would be given a lower rating. The question is how consumers are supposed to deal with these kinds of complexities. We know that consumers may respond differently to information depending on its complexity (Wright, 1987; Swait and Adamowicz, 2001; So and Smith, 2004). For example, the number of contradictions in the information increases information complexity, which can affect decision making accuracy (So and Smith, 2004). An additional difficulty might emerge when different information types are presented by different information displays, such as numbers versus stars. It is unknown whether inconsistent information displays further hamper consumers' ability to process healthcare information.

Information display, such as words, numbers and symbols, may be another source of difficulty for consumers. In an early review of McCormack and colleagues (1996) – concerned largely with offline comparative healthcare information - the dominant presentation approaches used combinations of text and graphics or text and percentages in a table format. The use of numbers may lead to confusing and overwhelming information display. Consumers may not have an emotional or affective understanding of numbers, and the information may therefore be less evaluable (Hibbard and Peters, 2003). Hibbard and colleagues demonstrated that visual display in the form of stars facilitated consumers' comprehension and use of comparative healthcare information (Hibbard et al., 2001a; Hibbard et al., 2002a). Previous research has also shown that the readability of text is important for consumers (Eysenbach and Köhler, 2002; Keselman et al., 2007) and that health information on the Internet is often beyond consumers' reading ability (Berland et al., 2001; Eysenbach et al., 2002).

In short, the large amount and variety of information as well as how the information is presented are important issues pertaining to the publication of comparative healthcare information. Indeed, these issues have been cited in the literature since the early days of offline and online public reporting (McCormack et al., 1996; Carlisle, 2007). In the past decade, the number of different information types has increased, largely due to emerging information technology. Apart from a few reviews of information types presented and presentation formats used (Carlisle, 2007; Harris-Kojetin et al., 2001; McCormack et al., 1996), no comprehensive reviews have been conducted recently. More importantly, since more countries are adopting a public reporting system for healthcare information, it is of interest to document which strategies are applied in countries outside the United States to present different types of healthcare information. If we want to understand the decision maker's current healthcare information environment and be able to simplify it, a decent up-to-date overview of what consumers are actually confronted with is needed.

The aim of the present paper was to describe how different types of information are presented on websites containing comparative healthcare information. Our primary concern was the structure used to integrate different information types. We further reviewed the websites on the drill down paths offered on websites and how information was displayed. Drill down paths are paths that provide options to get more detailed information that may also be used to structure the total amount of available information. Information display can make information more evaluable to consumers. Our intention was not to review all of the websites that exist worldwide, but rather to provide an overview of the state of the art that can be used as a resource of knowledge for website managers and Internet researchers. Our research question was: *"How are different types of Web-based comparative healthcare information presented worldwide?"*

Methods

Search strategy

This study was conducted from July to September in 2008. Two key Dutch publications on public reporting of healthcare were used as a starting point to search for websites providing healthcare information to the public (Groenewoud, Kreuger, and Huijsman, 2006; Lugtenberg and Westert, 2007). These studies only included countries in which both performance indicators and public reporting have been incorporated in the healthcare system. We then performed a search using the Web search engine *Google* for particular terms and their translations in English, German, French, Spanish, Italian, Dutch, Norwegian, Swedish, Danish, and Finnish. The terms chosen were: *quality, quality indicators, healthcare, compare, choose, information, patients, consumers, satisfaction, health plans, hospitals, nursing homes, home care,* and *mental healthcare*. We included only websites that contained comparative information, that is, information by which consumers can make explicit comparisons between healthcare providers or health plans. For websites where information for healthcare providers was presented separately, we reviewed only the comparative information. We chose to do this because, as stated previously, comparative information is intended to facilitate consumer choice in healthcare.

Analyses

We visited the selected websites and assessed the presentation approaches that were used. The following aspects were systematically considered:

1. The healthcare sector(s) for which information was presented;
2. The types of information presented;
3. The degree of integration of different information types;
4. The drill down paths provided;
5. The information displays used.

For the types of information, we followed the classification system of Van Loon and Tolboom (2005) for public healthcare information:

A = factual information based on provider characteristics and services;
B = quality information based on performance indicators;
C = quality information based on healthcare user experience.

The degree to which different information types were displayed in an integrated way was also assessed. In the absence of a ready taxonomy of classifying presentation formats, we classified information integration from 0 (no integration; different information types on different pages), 1 (limited integration; different types of information on one page, but no integration in a single table), 2 (medium amount of integration; different information types on one page, but clearly separated from each other), to 3 (high level of integration; different information types presented in a single table). Drill down paths were assessed qualitatively according to the different approaches on the websites; we used no particular classification system. Finally, we reviewed the display of information and focused on the use of words, numbers, bar graphs, and different types of symbols. All analyses and coding activities were performed by two of the authors (OD and YH) independently. They discussed their findings and searched for agreement.

Besides reviewing the website content, we disseminated a short survey to each website included in this study. This survey contained open and closed questions about which types of information the website presented and how the presentation formats were chosen. The survey was either directly mailed to the website (in case a direct contact address was found on the website) or delivered indirectly by contacting the website through a request form. Respondents could return the completed survey to the researchers by email or by post.

Results

Search results

In total, we found 42 websites in 10 different countries that presented comparative healthcare information. Table 4.1 gives a short description of each website. Most websites we identified were in the United States, although we also found a range of websites in the United Kingdom, Germany, and the Netherlands. The aim of most reporting systems was to inform consumers about healthcare performance and to support consumers' choices. A few websites were not explicitly designed for consumers, but because these websites were intended to increase public accountability and were accessible for consumers, we included them in the current study.

Table 4.1 Reviewed websites shortly described

Country and website [a]	**Abbreviation**	**URL (WebCite URL)**	**Description**
Australia			
1. Your Hospitals	YH	http://www.health.vic.gov.au/yourhospitals (http://www.webcitation.org/5clVd3AEQ)	Initiative of the Consumer Participation and Information Program. The aim is to provide information to patients, carers, and healthcare professionals. The information is generated by the Department of Health, its funded agencies and special interest groups.
Canada			
2. Hospital Report	HR	http://www.hospitalreport.ca (http://www.webcitation.org/5clVfMnoX)	Initiative of the HHRC (Hospital Report Research Collaborative). The aims are to increase public accountability and to improve quality of care.
Denmark			
3. Sundhed	Sund	http://www.sundhed.dk (http://www.webcitation.org/5clVsUhI3)	Initiative of the Danish Ministry of Health. The reporting system 'Sundhedkvalitet' is managed by the National Board of Health. The aim is to support consumers in their healthcare choices.
Germany			
4. Weisse Liste	WL	http://www.weisse-liste.de (http://www.webcitation.org/5clW384wA)	Initiative of the Bertelsmann Stiftung in collaboration with patient associations and scientific partners. The aims are to empower consumers and to support them in their healthcare choices.

Country and website [a]	Abbreviation	URL (WebCite URL)	Description
5. Klinik Führer Rhein-Ruhr	KRR	http://www.kliniken-rhein-ruhr.de (http://www.webcitation.org/5clW4zeOf)	Initiative of the Initiativkreis Ruhrgebiet Verwaltungs-GmbH (a collaborative of hospitals) in collaboration with scientific partners. The aim is to support consumers in their healthcare choices. The information is generated from the hospitals and from patient surveys.
6. Klinikführer Rheinland	KR	http://www.klinikfuehrer-rheinland.de (http://www.webcitation.org/5clWCp5WX)	Initiative of the Krankenhauszweckverband Köln, Bonn, und Region (KHVZ) (a collaborative of hospitals). The aim is to support consumers in their healthcare choices. The information is generated from the hospitals by the KHVZ.
7. Hamburger Krankenhaus-spiegel	HK	http://www.hamburger-krankenhausspiegel.de (http://www.webcitation.org/5clWR10vD)	Initiative of 25 hospitals in collaboration with other partners. The aim is to support consumers in their healthcare choices, and to stimulate providers' quality improvement initiatives. The information is generated from the hospitals by independent audit parties.
8.Klinikbe-wertungen	Klinik	http://www.klinikbewertungen.de (http://www.webcitation.org/5clWVbRiG)	Initiative of MedizInfo, which is an Internetportal about health and healthcare. The aim is to provide an independent online forum about consumers' experiences in order to help consumers in their healthcare choices. A second aim is to stimulate providers' quality improvement initiatives. The information is generated from consumers' reports on the forum.

Country and website [a]	Abbreviation	URL (WebCite URL)	Description
Ireland			
9. Health Information and Quality Authority	HIQA	http://www.hiqa.ie (http://www.webcitation.org/5clZNb8km)	Initiative of the Health Information and Quality Authority (part of the government's health reform program). The aims are to monitor quality of care on a set of standards and to stimulate improvement initiatives. A third aim is to support consumers in their healthcare choices.
The Netherlands			
10. kiesBeter	KB	http://www.kiesBeter.nl (http://www.webcitation.org/5clT0whdn)	Initiative of the Ministry of Health and managed by the National Institute for Public Health and the Environment (RIVM) in collaboration with patient associations, healthcare providers, and scientific partners. The aim is to provide an independent portal for all questions from the public about health and healthcare. One particular aim is to support consumers in their healthcare choices.
11. Independer Gezondheids-zorg	Ind	http://www.independer.nl (http://www.webcitation.org/5clU1lwM3)	Initiative of Independer.nl in collaboration with other parties. The aim is to increase transparency and to support consumers in their healthcare choices. The information is generated by the external parties Mediquest and Zorgweb.
12. Zorgkiezer	Zorgk	http://www.zorgkiezer.nl (http://www.webcitation.org/5clU6C5MZ)	Initiative of DGN Publishers (Internet company) in collaboration with healthcare providers and health insurance companies. The aim is to help consumers and healthcare professionals in their choices. The information is generated by the website editors.

Country and website [a]	Abbre-viation	URL (WebCite URL)	Description
13. Zorgbelang	Zorgbel	http://www.zorgbelang-nederland.nl (http://www.webcitation.org/5clUFSXlV)	Initiative of Zorgbelang Nederland (association of local organizations advocating healthcare consumers' interests) in collaboration with patient associations and other parties. The aim is to provide the public with information about healthcare.
14. Agis Zorggids	Agis	http://www.agisweb.nl (http://www.webcitation.org/5clUPVzGY)	Initiative of health insurer Agis. The aim is to inform the insured about their options in healthcare (concerning contracted providers) and to provide public accountability for the activities of Agis. The information is generated by external parties.
15. Menzis Behandelwijzer	Menz	http://www.menzis.nl (http://www.webcitation.org/5clUWhkfA)	Initiative of health insurer Menzis. The aim is to support the insured in their healthcare choices (concerning contracted providers). The information is generated by the health purchase department and by external parties.
16. VGZ Zorggids - Vergelijk en kies	VGZ	http://www.vgz.nl (http://www.webcitation.org/5clUcadC0)	Initiative of health insurer VGZ. The aim is to support the insured in their healthcare choices (concerning contracted providers). The information is generated by external parties.
17. CZ Ziekenhuisvergelijker	CZ	http://www.cz.nl (http://www.webcitation.org/5clUhnHi0)	Initiative of health insurer CZ The aim is to support the insured in their healthcare choices (concerning contracted providers). The information is generated by external parties.

Country and website [a]	Abbreviation	URL (WebCite URL)	Description
18. AD Ziekenhuisvergelijker	AD	http://www.ad.nl/ziekenhuistop100 (http://www.webcitation.org/5clUkUGcj)	Initiative of the daily paper Algemeen Dagblad (AD), in collaboration with healthcare professionals and medical associations. The aim is to inform the public about hospital performance. The information is generated by the AD; hospitals are asked to provide the information.
19. Elsevier Beste Ziekenhuizen	EBZ	http://www.elsevier.nl/artimg/200709/besteziekenhuizen.pdf (http://www.webcitation.org/5clUqCXSH)	Initiative of the weekly magazine Elsevier in collaboration with healthcare professionals, managers, and researchers. The aim is to inform the public about hospital performance concerning current questions in healthcare.
20. Vaatpatient	VV	http://www.vaatpatient.nl (http://www.webcitation.org/5clUrNSEI)	Initiative of the Vereniging van Vaatpatienten (VVVP) (vascular disease patient association). The aim is to support patients in their healthcare choices. The information is generated by external parties. The VVVP provides quality marks based on the information.
Norway			
21. Fritt Sykehusvalg Norge	FSN	http://www.frittsykehusvalg.no (http://www.webcitation.org/5clV91h05)	Initiative of the Norwegian Ministry of Health, in collaboration with patient advisors. The aim is to empower consumers and to support consumers and healthcare professionals in their choices. In addition, the aim is to stimulate competition and quality improvement.

Country and website [a]	Abbre-viation	URL (WebCite URL)	Description
United Kingdom			
22. Dr. Foster	Fos	http://www.drfoster.co.uk (http://www.webcitation.org/5clV0liGA)	Private initiative in collaboration with the Information Centre for Health and Social Care, health service organizations and local authorities. The aims are to inform consumers and healthcare professionals about the options in healthcare, and to support consumers in their healthcare choices. In addition, the aim is to stimulate quality improvement initiatives. The information is generated from a number of external sources.
23. NHS Choices	NHS	http://www.nhsdirect.nhs.uk (http://www.webcitation.org/5clVBVDFE)	Initiative of the NHS (National Health Services), in collaboration with the National Library for Health, the Information Centre for Health and Social Care, the Healthcare Commission and other parties. The aim is to support consumers in their decisions about health and healthcare.
24. HFEA Clinics Guide	HFEA	http://www.hfea.gov.uk (http://www.webcitation.org/5clVXndpE)	Initiative of the Human Fertilisation and Embryology Authority (HFEA). The aims are to inform consumers about the options in healthcare and to support them in their healthcare choices. The information is generated by the HFEA and provided by the clinics.
25. BAAPS	BAAPS	http://www.baaps.org.uk (http://www.webcitation.org/5clVJK6mK)	Initiative of the British Association of Aesthetic Plastic Surgeons. The aims are to inform the public about the practice and quality of plastic surgery, and to support consumers in their healthcare choices.

Country and website [a]	Abbre-viation	URL (WebCite URL)	Description
26. Private Healthcare UK	PHUK	http://www.privatehealth.co.uk (http://www.webcitation.org/5clVKQVND)	Initiative of Intuition Communication Ltd (a commercial organization). The aims are to inform consumers about options in private healthcare and to support them in their healthcare choices.
United States			
27. Hospital Compare	HC	http://www.hospitalcompare.hhs.gov (http://www.webcitation.org/5clZSIjyU)	Initiative of the US Department of Health and Human Services (HHS). Hospital Compare is a collaboration of the Centers for Medicare and Medicaid Services (CMS), the Department of Health and Human Services, and members of the Hospital Quality Alliance (HQA). The aim is to support consumers in their healthcare choices. The information is provided by the healthcare providers.
28. Leapfrog	Leap	http://www.leapfroggroup.org (http://www.webcitation.org/5clZVjgKj)	Initiative of the Leapfrog Group (a collaboration of employers). The aim is to stimulate transparency and access to information in order to support health purchasers and consumers in their choices. In addition, the aim is to stimulate quality improvement initiatives. The information is provided by the healthcare providers.

Country and website [a]	Abbre-viation	URL (WebCite URL)	Description
29. Patient Advocate	PA	http://www.opa.ca.gov/report_card (http://www.webcitation.org/5clZX6PqW)	Initiative of the Office of the Patient Advocate (OPA), in collaboration with the Department of Managed Health Care. The aim is to inform healthcare consumers about their rights and about the options in healthcare (patient empowerment). In addition, aims are to stimulate healthcare transparency and to support healthcare purchasers and consumers in their choices. The information is generated from a number of external sources.
30. Nursing Home Compare	NHC	http://www.medicare.gov/NHcompare (http://www.webcitation.org/5clZpsiiX)	Initiative of Medicare. The aims are to inform the public about nursing home options in Medicare and to support consumers in their choices. The information is generated by external parties and/or provided by the nursing homes.
31. Home Health care Compare	HHC	http://www.medicare.gov/HHcompare (http://www.webcitation.org/5clZlSuKF)	Initiative of Medicare. The aims are to inform the public about home healthcare options in Medicare and to support consumers in their choices. The information is generated by external parties and / or provided by the home healthcare providers.
32. Dialysis Facility Compare	DFC	http://www.medicare.gov/dialysis (http://www.webcitation.org/5clZvYdSV)	Initiative of Medicare. The aims are to inform the public about chronic kidney disease and dialysis, about dialysis facility options in Medicare, and to support consumers in their choices. The information is generated by external parties and/or provided by the facilities.

Country and website [a]	Abbre-viation	URL (WebCite URL)	Description
33. Medicare Options Compare	MOC	http://www.medicare.gov/MPPF (http://www.webcitation.org/5cla2KXFv)	Initiative of Medicare. The aims are to inform the public about health plans options in Medicare and to support consumers in their choices. The information is generated by external parties and / or provided by the plans.
34. U Compare Healthcare	UCH	http://www.ucomparehealthcare.com (http://www.webcitation.org/5cla68Ljp)	Initiative of About, Inc (part of the New York Times Company). The aim is to support consumers in their healthcare choices. The information is generated from a number of external federal sources
35. California Nursing Home Search	CANHS	http://www.calnhs.org (http://www.webcitation.org/5claA0qhi)	Initiative of the California Healthcare Foundation, in collaboration with the Department of Social and Behavioral Sciences of the University of California. The aim is to inform the public about the options in healthcare. The information is generated from a number of external state and federal sources.
36. NCQA	NCQA	http://www.ncqa.org (http://www.webcitation.org/5claG27UP)	Initiative of the National Committee for Quality Assurance (NCQA). The aim is to stimulate transparency and quality improvement initiatives. In addition, the aim is to support consumers in their healthcare decisions. The information (based on a set of standardized measures) is generated by the NCQA.

Country and website [a]	**Abbre-viation**	**URL (WebCite URL)**	**Description**
37. US News Health	USN	http://health.usnews.com/sections/health (http://www.webcitation.org/5claM7ca0)	Initiative of the US News magazine (which also includes a weekly digital magazine). The aim is to inform the public about performance of hospitals (America's best hospitals) and about health plans (America's best health plans). The information is generated by the magazine's editors.
38. AHD.com	AHD	http://www.ahd.com (http://www.webcitation.org/5claNNKMz)	Initiative of the American Hospital Directory, Inc. (a private company). The aim is to inform subscribers about hospital performance. The information is generated by the company and extracted form a number of external sources.
39. Health Care Choices	HCC	http://www.healthcarechoices.com (http://www.webcitation.org/5claTftLr)	Initiative of Health Care Choices (HCC) which is a not-for-profit corporation. The aims are to inform the public about the healthcare system and to support healthcare purchasers and consumers in their choices.
40. Quality Check	QC	http://www.qualitycheck.org (http://www.webcitation.org/5claYPkbV)	Initiative of the Joint Commission on Accreditation of Healthcare Organizations (JCAHQ), which is a non-for-profit organization. The aim is to support consumers in their healthcare choices. The information is provided by the healthcare providers to the Joint Commission.
41. PHC4	PHC	http://www.phc4.org (http://www.webcitation.org/5ndQxiDQX)	Initiative of the Pennsylvania's Health Care Cost Containment Council. The aim is to increase transparency and competition between healthcare providers. The information is generated from hospitals and health plans by the Council.

Country and website [a]	Abbre-viation	URL (WebCite URL)	Description
Sweden			
42. Aldreguiden	Aldre	http://www.socialstyrelsen.se/aldreguiden (http://www.webcitation.org/5cladHprj)	Initiative of Socialstyrelsen (a governmental organization of the Ministry of Health). The aims are to inform consumers about the options in elderly care and to support their choices. In addition, the aim is to stimulate quality improvement initiatives. The information is provided by local authorities.

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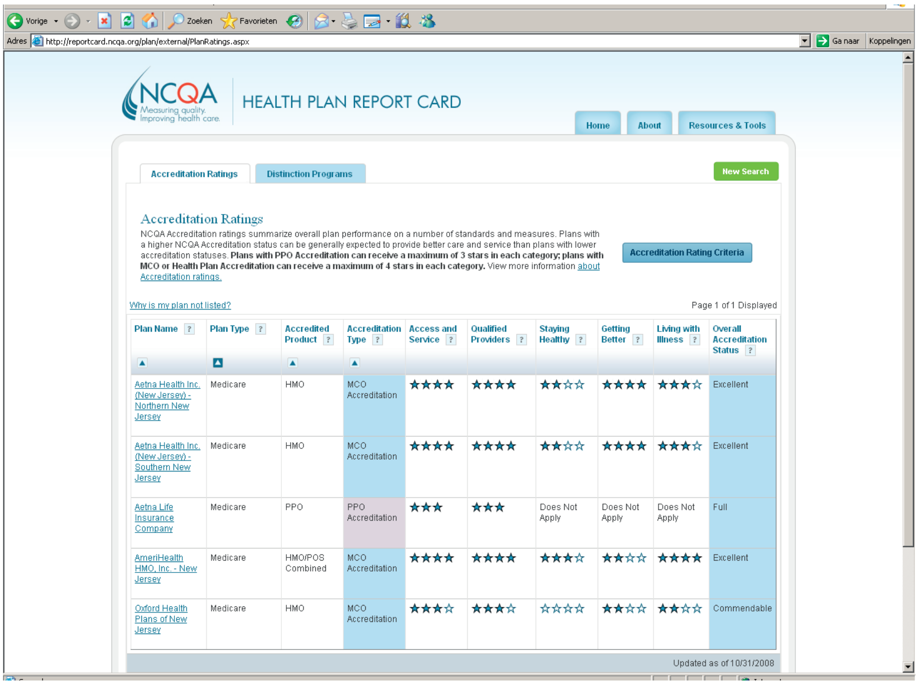
[a] Description based on website content in September 2008. Website content and presentation formats change over time. Therefore, the URLs have been archived: the URLs within brackets can be used to view the information on the home page.

Most websites contained, in one way or another, both summary and more detailed information. Summary information was usually presented in tabular formats using rows to display providers and columns to display attributes (see Figure 4.1). Tables with a display configured differently (providers in columns and attributes in rows) were also common, but this configuration was not typically used in summary tables. However, tables configured in this way were frequently found to present more detailed comparative information pertaining to the specific providers selected. Although some summary tables presented many different attributes, in most cases only a limited number of attributes (about 3 to 7) was displayed. In some summary tables, the main attributes were divided into sub-attributes. A frequently used method was to allow the consumer to determine the amount of information to be presented in a table.

Figure 4.1 Example of a typical tabular format displaying providers in rows and attributes in columns



Accreditation Ratings

NCQA Accreditation ratings summarize overall plan performance on a number of standards and measures. Plans with a higher NCQA Accreditation status can be generally expected to provide better care and service than plans with lower accreditation statuses. **Plans with PPO Accreditation can receive a maximum of 3 stars in each category; plans with MCO or Health Plan Accreditation can receive a maximum of 4 stars in each category.** View more information about Accreditation ratings.

Why is my plan not listed?

Page 1 of 1 Displayed

Plan Name ?	Plan Type ?	Accredited Product ?	Accreditation Type ?	Access and Service ?	Qualified Providers ?	Staying Healthy ?	Getting Better ?	Living with Illness ?	Overall Accreditation Status ?
Aetna Health Inc. (New Jersey) - Northern New Jersey	Medicare	HMO	MCO Accreditation	★★★★	★★★★	★★☆☆	★★★★	★★★☆	Excellent
Aetna Health Inc. (New Jersey) - Southern New Jersey	Medicare	HMO	MCO Accreditation	★★★★	★★★★	★★☆☆	★★★★	★★★☆	Excellent
Aetna Life Insurance Company	Medicare	PPO	PPO Accreditation	★★★	★★★	Does Not Apply	Does Not Apply	Does Not Apply	Full
AmeriHealth HMO, Inc. - New Jersey	Medicare	HMO/POS Combined	MCO Accreditation	★★★★	★★★★	★★★☆	★★☆☆	★★★★	Excellent
Oxford Health Plans of New Jersey	Medicare	HMO	MCO Accreditation	★★★☆	★★★☆	☆☆☆☆	★★☆☆	★★☆☆	Commendable

Updated as of 10/31/2008

Information characteristics

Table 4.2 provides an overview of the information characteristics concerning the reviewed websites.

Table 4.2 Reviewed websites and their information characteristics

Website [a]	**Healthcare sector**	**Types of information** [b]	**Integration** [c]	**Drill down paths**	**Information display**	**Rationale for presentation formats** [d]
1. YH	Hospitals	B, C	2	No drill down paths, reports downloaded as PDF files	Words; Numbers	-
2. HR	Hospitals	B, C	0	No drill down paths, reports downloaded as PDF files	Numbers	-
3. Sund	Hospitals	A, B, C	0 (separate pages for different types of information); 2 (different types in one table by consumer action)	Drill down paths to same information per provider	Numbers; Stars (5); Capitals	-
4. WL	Hospitals, (will include nursing homes and rehabilitation facilities in near future)	A, B, C	1	Drill down paths to more specific information per hospital	Words; Numbers; Horizontal bars; Round icons (favorites)	D, E, F
5. KRR	Hospitals	A, B, C	3	Drill down paths to more specific information per hospital	Words; Numbers; Thermometers	-

Website [a]	**Healthcare sector**	**Types of infor-mation** [b]	**Integration** [c]	**Drill down paths**	**Information display**	**Rationale for presentation formats** [d]
6. KR	Hospitals	A, B	3	Drill down paths to more specific information per hospital	Words; Numbers; Traffic lights (3 colors); Horizontal bars	D, E, F
7. HK	Hospitals	A, B	0	No drill down paths	Numbers; Horizontal bars	-
8. Klinik	Hospitals	A, C (anecdotal information)	3	Drill down paths to specific evaluations of patients	Numbers; Stars (6); Words	-
9. HIQA	Hospitals	B	-	No drill down paths, reports downloaded as PDF files	Words in different colors (= symbols)	-
10. KB	Hospitals, nursing homes, home care, outpatient mental healthcare, care for the handicapped, primary care, palliative care, health plans	A, B, C	0 and 2 (depending on healthcare sector) 3 (summary information)	Drill down paths to more detailed information	Words; Numbers; Capitals; Stars (3); Stars (5); Horizontal bars (1)	D, E, F

Website [a]	**Healthcare sector**	**Types of infor-mation** [b]	**Integration** [c]	**Drill down paths**	**Information display**	**Rationale for presentation formats** [d]
11. Ind	Hospitals, home care, primary care, physiotherapy, health plans	A, B, C	3	Drill down paths to more specific information per provider	Words; Numbers; Stars (4); Stars (5); Round icons (colored); Coins; Horizontal bars	D, E, G
12. Zorgk	Hospitals, health plans	A, B	3	Drill down paths to more specific information per provider	Words; Numbers; Stars (5); Checkmarks	-
13. Zorgbel	Nursing homes, home care, care for the handicapped, outpatient mental healthcare	A (links to websites with B and C)	-	No drill down paths	Words	-
14. Agis	Contracted hospitals	A, C	0	No drill down paths	Words; Round icons (3)	E, F

Website [a]	**Healthcare sector**	**Types of information** [b]	**Integration** [c]	**Drill down paths**	**Information display**	**Rationale for presentation formats** [d]
15. Menz	Contracted hospitals	A, B, C	3	No drill down paths	Words; Numbers; Stars (4); Round icons (with certain degree of filling); Plus icons (3)	F, G
16. VGZ	Contracted hospitals and other providers	A, B, C	3	No drill down paths	Words; Numbers; Squares (4)	-
17. CZ	Contracted hospitals	A, B, C	1	No drill down paths	Words; Numbers; Stars (4); Stars (5)	-
18. AD	Hospitals	B, C	2	Drill down paths to more specific information per provider	Words; Numbers	-
19. EBZ	Hospitals	A, B	3	No drill down paths, reports downloaded as PDF files	Round icons (5, colored); Horizontal bars	-
20. VV	Hospitals	A, B	2	Drill down paths to more specific information per provider	Numbers; Checkmarks	-

Website [a]	**Healthcare sector**	**Types of information** [b]	**Integration** [c]	**Drill down paths**	**Information display**	**Rationale for presentation formats** [d]
21. FSN	Hospitals	A, B, C	1	Drill down paths to somewhat more detailed quality information	Numbers; Words; Symbols -, +, 0	-
22. Fos	Hospitals, specialized clinics, complementary practitioners	A, B	1 (with exception of distance)	Drill down paths to more specific information per hospital; Selection options to obtain more detailed information	Words; Numbers; Horizontal bars; Stars (5); Squares (3)	-
23. NHS	Hospitals	A, B, C	3 (summary information); 1 (detailed information)	Drill down paths to more detailed information; Drill down paths to more specific information per provider	Words; Numbers; Round icons with words; Stars (3); Horizontal bars; Squares (5)	-
24. HFEA	Specialized clinics	A, B	0	No drill down paths	Words; Numbers; Horizontal bars; Triangles (1)	-
25. BAAPS	Plastic surgeons	A, B	2	Drill down paths to more specific information per provider	Words; Numbers; Stars (1)	-

Website [a]	**Healthcare sector**	**Types of information** [b]	**Integration** [c]	**Drill down paths**	**Information display**	**Rationale for presentation formats** [d]
26. PHUK	Hospitals, doctors, GP's, nursing homes, cosmetic surgery, dental care, health plans	A, B, C (anecdotal information)	1	Drill down paths to more specific information per provider	Words; Numbers; Ribbons (1)	D
27. HC	Hospitals	A, B, C	3 (summary information); 2 (after selection of hospitals)	Drill down paths to hospital location on map	Words; Numbers; Horizontal bars (1)	-
28. Leap	Hospitals	B	-	Drill down paths to more specific information per provider	Vertical bars (4); Horizontal bars (1)	-
29. PA	Medical groups, hospitals, health plans	B, C	3 (summary information); 0 (detailed information)	Drill down paths to more detailed information	Numbers; Stars (4); Horizontal bars (1); Round icons with words and colors (5)	-

Website [a]	**Healthcare sector**	**Types of information** [b]	**Integration** [c]	**Drill down paths**	**Information display**	**Rationale for presentation formats** [d]
30. NHC	Nursing homes	A, B	0 (summary information); 2 (detailed information)	Drill down paths to more specific information per provider; Drill down paths to provider location on map; Drill down paths to visual display in bar graphs	Words; Numbers; Cubes in bar (4); Horizontal bars	-
31. HHC	Home care	A, B	0 (summary information); 2 (detailed information)	Drill down paths to visual display in bar graphs	Words; Numbers; Checkmarks; Horizontal bars	-
32. DFC	Specialized centra	A, B	0 (summary information); 1 (detailed information)	Drill down paths to more specific information per provider; Drill down paths to more detailed quality information; Drill down paths to provider location on map	Words; Numbers; Horizontal bars; Checkmarks	-
33. MOC	Health plans	A, B, C	0 (summary information); 3 (detailed information)	Drill down paths to more specific information per health plan	Words; Numbers; Stars (5)	-

Website [a]	Healthcare sector	Types of information [b]	Integration [c]	Drill down paths	Information display	Rationale for presentation formats [d]
34. UCH	Doctors, hospitals, nursing homes, health plans, mammography centers; fertility clinics	A, B	1	Drill down paths to more specific information per provider	Words; Numbers; Vertical bars (1); Plus icons (1); Checkmarks	-
35. CANHS	Nursing homes, home care, hospices	A, B	3 (summary information); 1 (detailed information)	Drill down paths to more specific information per provider	Words; Numbers; Stars (3)	D
36. NCQA	Doctors, health plans	A, B, C	3 (summary and detailed information)	Drill down paths to more detailed quality information; Drill down paths to more specific information per provider	Words; Numbers; Stars (4); Horizontal bars; Certification symbols (1)	-
37. USN	Hospitals, health plans	B, C	0 (hospitals); 3 (health plans)	Drill down paths to more detailed information; Drill down paths to more specific information per provider	Words; Numbers; Round colored icons (5); Stars (5)	-

Website [a]	Healthcare sector	Types of information [b]	Integration [c]	Drill down paths	Information display	Rationale for presentation formats [d]
38. AHD	Hospitals	A, (B and C only when for members)	0 (summary and detailed information)	Drill down paths to more specific information per provider	Words; Numbers; Colored parts	-
39. HCC	Hospitals (and doctors for pay)	A, links to B	-	No drill down paths	Words; Numbers	-
40. QC	Hospitals, nursing homes, home care, outpatient mental healthcare	A, B	1 (summary information); 0 (detailed information)	Drill down paths to more specific information per provider; Drill down paths to more detailed information	Words; Numbers; Checkmarks; Certification symbols (1); Round icons (3)	-
41. PHC	Hospitals, health plans	A, B, C	3 (hospitals); 0 (health plans)	No drill down paths, reports downloaded as PDF files	Numbers; Round icons (3)	F
42. Aldre	Care for the elderly	B	-	Drill down paths to more detailed quality information	Numbers; Vertical bars	D, E, F

[a] Description based on website content in September 2008. Website content and presentation formats change over time. Therefore, the URLs have been archived (see Table 4.1).

[b] This classification is based on Van Loon and Tolboom (2005): A= Information based on provider characteristics and services; B= Quality information based on performance indicators; C= Quality information based on healthcare user experience.

[c] 0 = no integration of different types of information (different types of information on different pages); 1 = limited integration of different types of information (different types of information can be selected and viewed on one page, but no integration in one table on one page); 2 = quite amount of integration of different types of information (different types on one page, but clearly separated from each other); 3 = high level of integration of different types of information (different types of information presented in one table, with or without action of the consumer).

[d] D = test(s) of different formats; E = existing scientific knowledge; F = expert opinion; G = other rationale.

Healthcare sectors

On 32 of the 42 websites (76%), information about hospitals was presented. Although in recent years more information has become available in other healthcare sectors, such as nursing homes and home care (found on 10 websites; 24%), and health plans (found on 10 websites; 24%), hospital information clearly had the largest share on the Internet. Information about health plans was found mainly on US websites. Reporting systems containing information on several healthcare sectors were found mainly on websites from the United Kingdom and the United States.

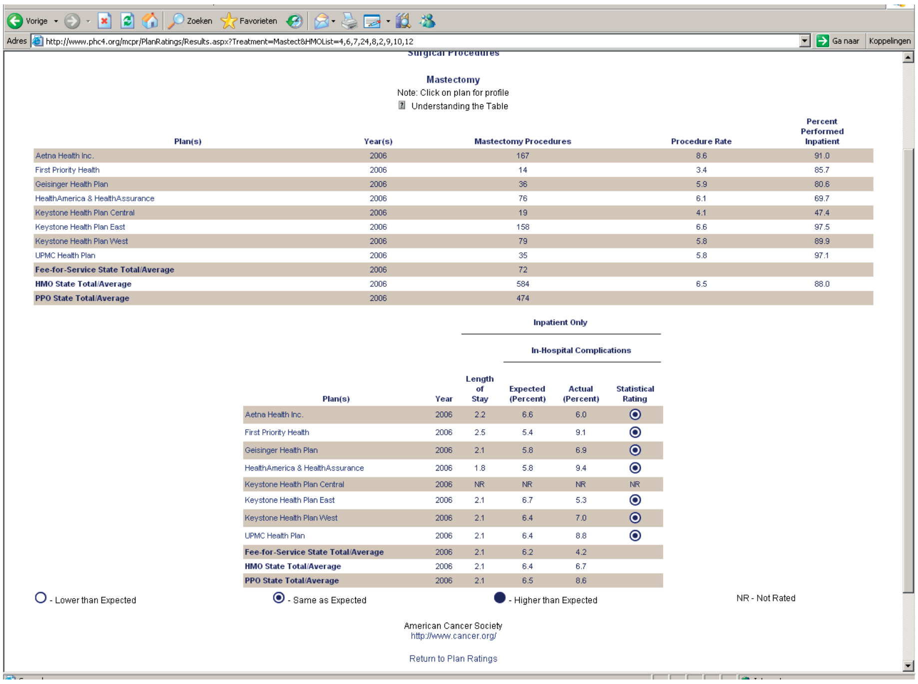
Types of information

The most common type of information found on the reviewed websites was quality information based on performance indicators (found on 37 websites; 88%). Information on healthcare providers' characteristics and services was also common (found on 34 websites; 81%), this information was usually presented for each provider separately. In these cases, we did not further evaluate the information. Quality information based on healthcare users' experiences was found on a little more than half (22; 52%) of the reviewed websites.

Integration of different information types

The degree of integration of different information types was most often classified as type 0 (no integration of different types of information; different types of information on different pages). This type of information integration was found on 15 websites (36%). Type 3 (high level of integration of different information types; different types of information presented in one table) was found on 17 websites (41%). The two integration structures falling in between these extremes were less often found: type 1 on 10 websites (24%) and type 2 on 9 websites (21%), respectively. Concerning type 1 and type 2 integration, many different options were used to separate the information types. For example, separate tab pages, menu bars, white spaces, bold headlines, and colors to distinguish between different information types were displayed. In some cases, different information displays were used at the same time. Examples of all four classifications are shown in Figures 4.2 to 4.5.

Figure 4.2 Type 0 integration (no integration of different types of comparative information). Example from PHC4 in the United States. Information on healthcare user experience is displayed, but information based on performance indicators can be found elsewhere on the website.



Adres http://www.phc4.org/mcpr/PlanRatings/Results.aspx?Treatment=Mastect&HMOList=4,6,7,24,8,2,9,10,12

Surgical Procedures

Mastectomy

Note: Click on plan for profile

Understanding the Table

Plan(s)	Year(s)	Mastectomy Procedures	Procedure Rate	Percent Performed Inpatient
Aetna Health Inc.	2006	167	8.6	91.0
First Priority Health	2006	14	3.4	85.7
Geisinger Health Plan	2006	36	5.9	80.6
HealthAmerica & HealthAssurance	2006	76	6.1	69.7
Keystone Health Plan Central	2006	19	4.1	47.4
Keystone Health Plan East	2006	158	6.6	97.5
Keystone Health Plan West	2006	79	5.8	89.9
UPMC Health Plan	2006	35	5.8	97.1
Fee-for-Service State Total/Average	2006	72		
HMO State Total/Average	2006	584	6.5	88.0
PPO State Total/Average	2006	474		

		Inpatient Only			
			In-Hospital Complications		
Plan(s)	Year	Length of Stay	Expected (Percent)	Actual (Percent)	Statistical Rating
Aetna Health Inc.	2006	2.2	6.6	6.0	◉
First Priority Health	2006	2.5	5.4	9.1	◉
Geisinger Health Plan	2006	2.1	5.8	6.9	◉
HealthAmerica & HealthAssurance	2006	1.8	5.8	9.4	◉
Keystone Health Plan Central	2006	NR	NR	NR	NR
Keystone Health Plan East	2006	2.1	6.7	5.3	◉
Keystone Health Plan West	2006	2.1	6.4	7.0	◉
UPMC Health Plan	2006	2.1	6.4	8.8	◉
Fee-for-Service State Total/Average	2006	2.1	6.2	4.2	
HMO State Total/Average	2006	2.1	6.4	6.7	
PPO State Total/Average	2006	2.1	6.5	8.6	

○ - Lower than Expected

◉ - Same as Expected

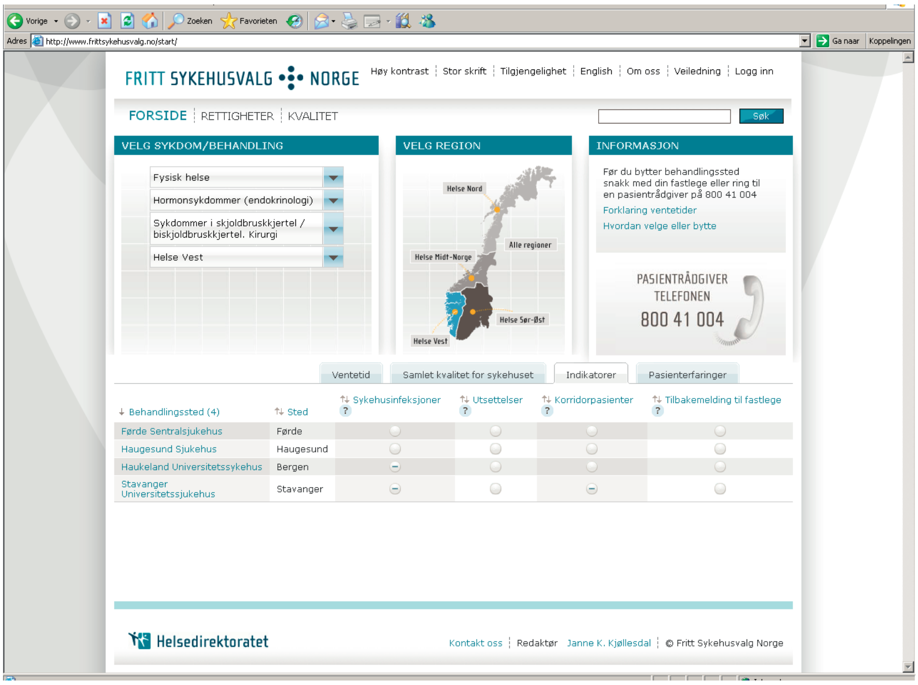
● - Higher than Expected

NR - Not Rated

American Cancer Society
http://www.cancer.org/

Return to Plan Ratings

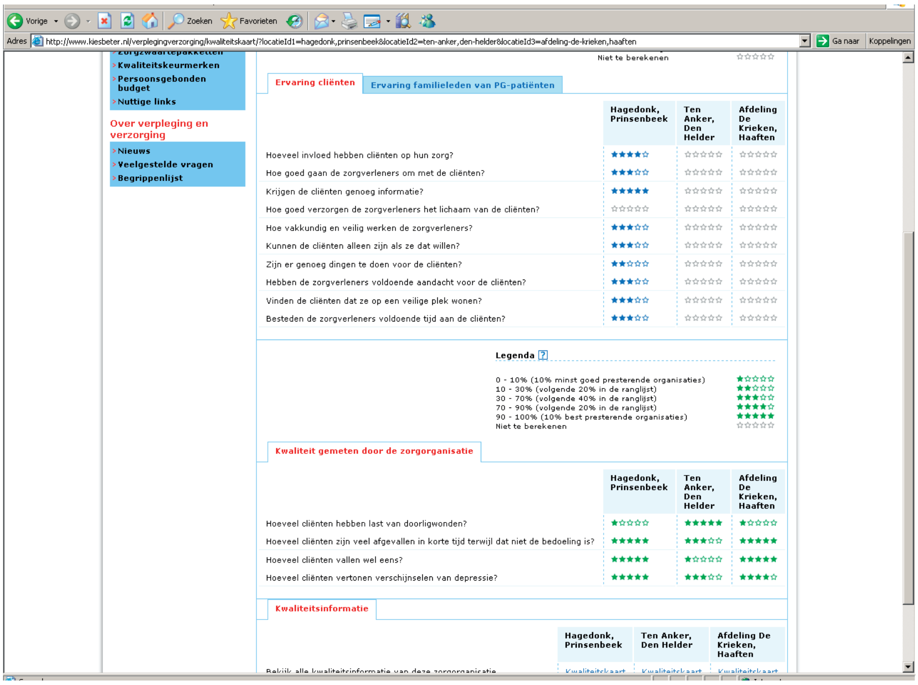
Figure 4.3 Type 1 integration (limited integration of different types of comparative information). Example from Fritt Sykehusvalg in Norway. Different information types can be selected on the displayed tab pages, but are not displayed in a single table simultaneously.



Før du bytter behandlingssted snakk med din fastlege eller ring til en pasientrådgiver på 800 41 004

↓ Behandlingssted (4)	⇅ Sted	⇅ Sykehusinfeksjoner ?	⇅ Utsettelser ?	⇅ Korridorpasienter ?	⇅ Tilbakemelding til fastlege ?
Førde Sentralsjukehus	Førde	○	○	○	○
Haugesund Sjukehus	Haugesund	○	○	○	○
Haukeland Universitetssykehus	Bergen	⊖	○	○	○
Stavanger Universitetssjukehus	Stavanger	⊖	○	⊖	○

Figure 4.4 Type 2 integration (medium amount of integration of different types of comparative information). Example from kiesBeter in the Netherlands. Different information types on one page, presented in separate blocks.



http://www.kiesbeter.nl/verplegingverzorging/kwaliteitskaart/?locatieId1=hagedonk,prinsenbeek&locatieId2=ten-anker,den-helder&locatieId3=afdeling-de-krieken,haaften

Niet te berekenen ☆☆☆☆☆

Ervaring cliënten | **Ervaring familieleden van PG-patiënten**

	Hagedonk, Prinsenbeek	Ten Anker, Den Helder	Afdeling De Krieken, Haaften
Hoeveel invloed hebben cliënten op hun zorg?	★★★★☆	☆☆☆☆☆	☆☆☆☆☆
Hoe goed gaan de zorgverleners om met de cliënten?	★★★☆☆	☆☆☆☆☆	☆☆☆☆☆
Krijgen de cliënten genoeg informatie?	★★★★★	☆☆☆☆☆	☆☆☆☆☆
Hoe goed verzorgen de zorgverleners het lichaam van de cliënten?	☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆☆
Hoe vakkundig en veilig werken de zorgverleners?	★★★☆☆	☆☆☆☆☆	☆☆☆☆☆
Kunnen de cliënten alleen zijn als ze dat willen?	★★★☆☆	☆☆☆☆☆	☆☆☆☆☆
Zijn er genoeg dingen te doen voor de cliënten?	★★☆☆☆	☆☆☆☆☆	☆☆☆☆☆
Hebben de zorgverleners voldoende aandacht voor de cliënten?	★★★☆☆	☆☆☆☆☆	☆☆☆☆☆
Vinden de cliënten dat ze op een veilige plek wonen?	★★★☆☆	☆☆☆☆☆	☆☆☆☆☆
Besteden de zorgverleners voldoende tijd aan de cliënten?	★★★☆☆	☆☆☆☆☆	☆☆☆☆☆

Legenda ?

0 - 10% (10% minst goed presterende organisaties)	★☆☆☆☆
10 - 30% (volgende 20% in de ranglijst)	★★☆☆☆
30 - 70% (volgende 40% in de ranglijst)	★★★☆☆
70 - 90% (volgende 20% in de ranglijst)	★★★★☆
90 - 100% (10% best presterende organisaties)	★★★★★
Niet te berekenen	☆☆☆☆☆

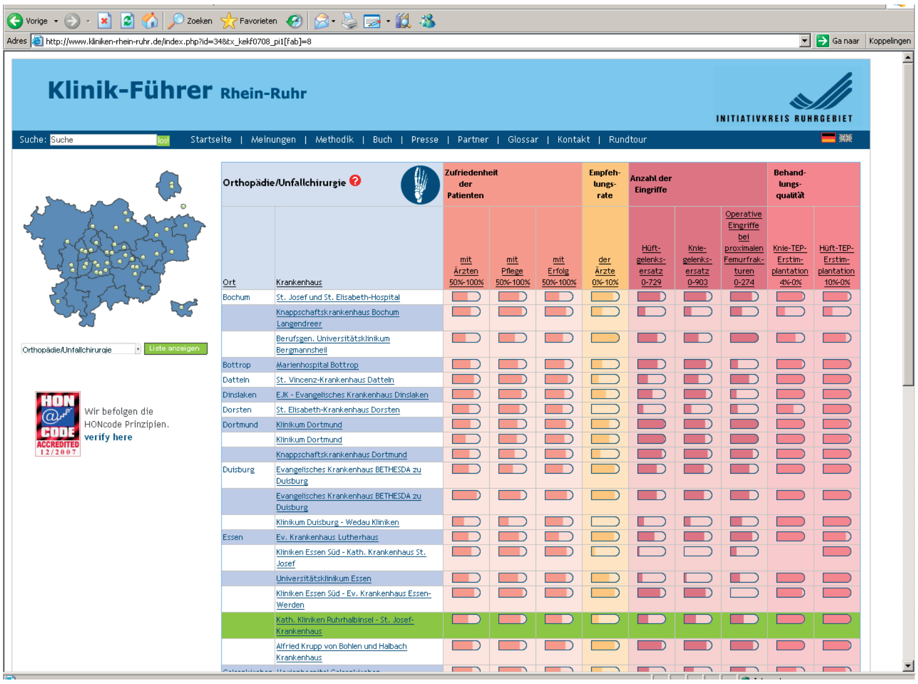
Kwaliteit gemeten door de zorgorganisatie

	Hagedonk, Prinsenbeek	Ten Anker, Den Helder	Afdeling De Krieken, Haaften
Hoeveel cliënten hebben last van doorligwonden?	★☆☆☆☆	★★★★★	★☆☆☆☆
Hoeveel cliënten zijn veel afgevallen in korte tijd terwijl dat niet de bedoeling is?	★★★★★	★★★☆☆	★★★★★
Hoeveel cliënten vallen wel eens?	★★★★★	★☆☆☆☆	★★★★★
Hoeveel cliënten vertonen verschijnselen van depressie?	★★★★★	★★★☆☆	★★★★☆

Kwaliteitsinformatie

	Hagedonk, Prinsenbeek	Ten Anker, Den Helder	Afdeling De Krieken, Haaften
Bekijk alle kwaliteitsinformatie van deze zorgorganisatie	Kwaliteitskaart	Kwaliteitskaart	Kwaliteitskaart

Figure 4.5 Type 3 integration (high integration of different types of comparative information). Example from Kliniken Rhein Ruhr in Germany. Different information types integrated in a single table.

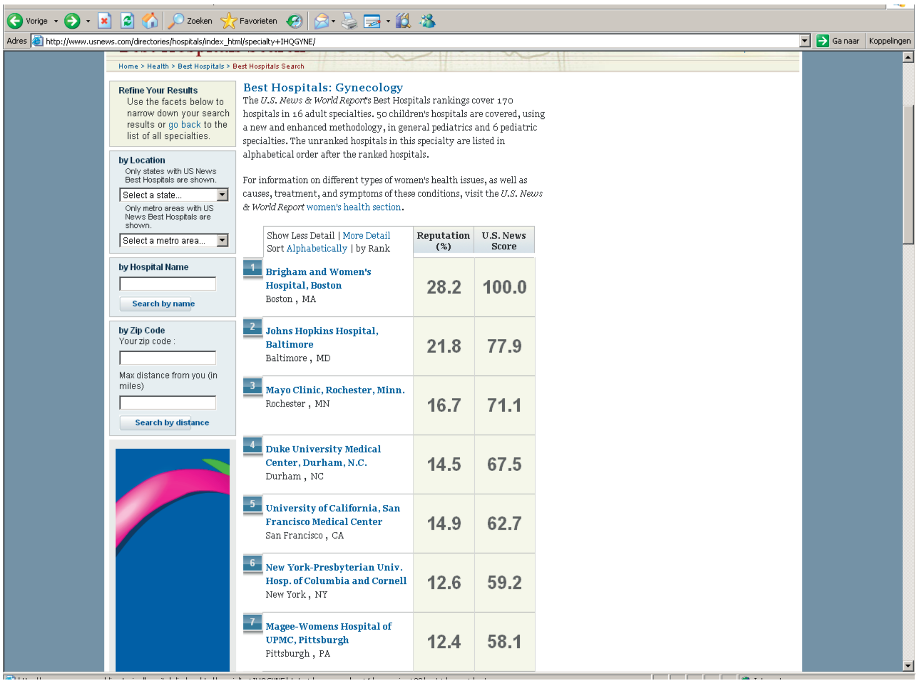


Ort	Krankenhaus
Bochum	St. Josef und St. Elisabeth-Hospital
	Knappschaftskrankenhaus Bochum Langendreer
	Berufsgen. Universitätsklinikum Bergmannsheil
Bottrop	Marienhospital Bottrop
Datteln	St. Vincenz-Krankenhaus Datteln
Dinslaken	EJK - Evangelisches Krankenhaus Dinslaken
Dorsten	St. Elisabeth-Krankenhaus Dorsten
Dortmund	Klinikum Dortmund
	Klinikum Dortmund
	Knappschaftskrankenhaus Dortmund
Duisburg	Evangelisches Krankenhaus BETHESDA zu Duisburg
	Evangelisches Krankenhaus BETHESDA zu Duisburg
	Klinikum Duisburg - Wedau Kliniken
Essen	Ev. Krankenhaus Lutherhaus
	Kliniken Essen Süd - Kath. Krankenhaus St. Josef
	Universitätsklinikum Essen
	Kliniken Essen Süd - Ev. Krankenhaus Essen-Werden
	Kath. Kliniken Ruhrhalbinsel - St. Josef-Krankenhaus
	Alfried Krupp von Bohlen und Halbach Krankenhaus

Drill down paths

A considerable number of websites (29; 69%) provided drill down paths to more specific information. The most common types of drill down paths were paths to more specific information per provider (on 21 websites; 50%) and paths to more detailed (underlying) information (on 11 websites; 26%). The information per provider to which a Web page was linked usually consisted of very specific information listed on a single Web page. Concerning more detailed comparative information, the degree to which more specific information was provided differed across websites. Figure 4.6 shows an example of more detailed information available after drilling down.

Figure 4.6 Example of a drill down path to more detailed information. Example from US News Health. More detailed information can be found by clicking on 'more detail'.



http://www.usnews.com/directories/hospitals/index_html/specialty+IHQGYNE/

Refine Your Results
Use the facets below to narrow down your search results or go back to the list of all specialties.

by Location
Only states with US News Best Hospitals are shown.
Select a state...
Only metro areas with US News Best Hospitals are shown.
Select a metro area...

by Hospital Name

by Zip Code
Your zip code :
Max distance from you (in miles)

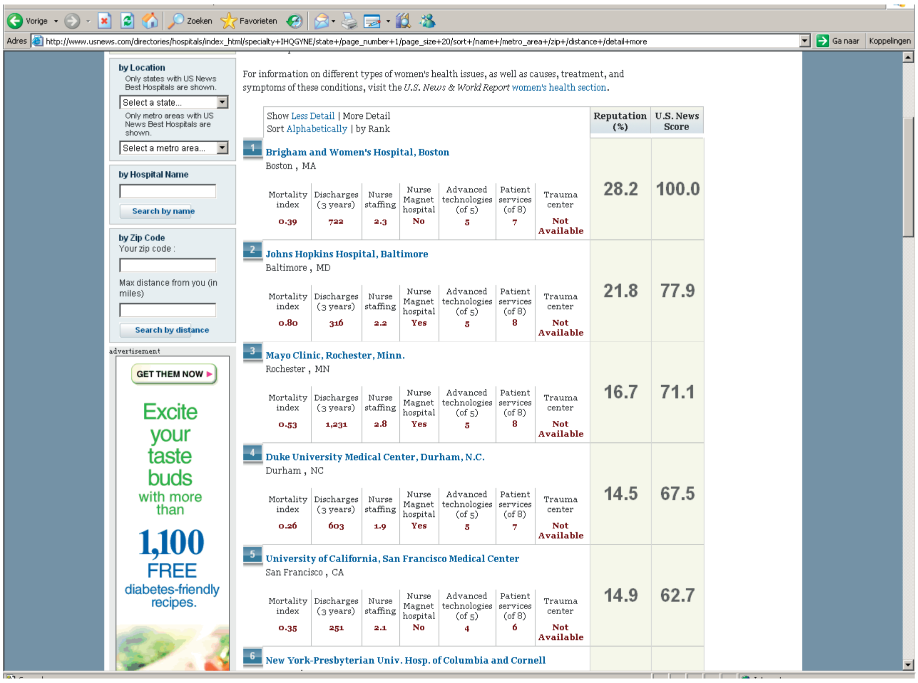
Best Hospitals: Gynecology

The *U.S. News & World Report*'s Best Hospitals rankings cover 170 hospitals in 16 adult specialties. 50 children's hospitals are covered, using a new and enhanced methodology, in general pediatrics and 6 pediatric specialties. The unranked hospitals in this specialty are listed in alphabetical order after the ranked hospitals.

For information on different types of women's health issues, as well as causes, treatment, and symptoms of these conditions, visit the *U.S. News & World Report* women's health section.

	Show Less Detail | More Detail Sort Alphabetically | by Rank	Reputation (%)	U.S. News Score
1	**Brigham and Women's Hospital, Boston** Boston , MA	28.2	100.0
2	**Johns Hopkins Hospital, Baltimore** Baltimore , MD	21.8	77.9
3	**Mayo Clinic, Rochester, Minn.** Rochester , MN	16.7	71.1
4	**Duke University Medical Center, Durham, N.C.** Durham , NC	14.5	67.5
5	**University of California, San Francisco Medical Center** San Francisco , CA	14.9	62.7
6	**New York-Presbyterian Univ. Hosp. of Columbia and Cornell** New York , NY	12.6	59.2
7	**Magee-Womens Hospital of UPMC, Pittsburgh** Pittsburgh , PA	12.4	58.1

Figure 4.6 (continued)



For information on different types of women's health issues, as well as causes, treatment, and symptoms of these conditions, visit the *U.S. News & World Report* women's health section.

Show Less Detail | More Detail
Sort Alphabetically | by Rank

Rank	Hospital	Mortality index	Discharges (3 years)	Nurse staffing	Nurse Magnet hospital	Advanced technologies (of 5)	Patient services (of 8)	Trauma center	Reputation (%)	U.S. News Score
1	Brigham and Women's Hospital, Boston Boston , MA	0.39	722	2.3	No	5	7	Not Available	28.2	100.0
2	Johns Hopkins Hospital, Baltimore Baltimore , MD	0.80	316	2.2	Yes	5	8	Not Available	21.8	77.9
3	Mayo Clinic, Rochester, Minn. Rochester , MN	0.53	1,231	2.8	Yes	5	8	Not Available	16.7	71.1
4	Duke University Medical Center, Durham, N.C. Durham , NC	0.26	603	1.9	Yes	5	7	Not Available	14.5	67.5
5	University of California, San Francisco Medical Center San Francisco , CA	0.35	251	2.1	No	4	6	Not Available	14.9	62.7
6	New York-Presbyterian Univ. Hosp. of Columbia and Cornell									

Information display

The use of numbers (37; 88%) and words (32; 76%) were most commonly used to display comparative healthcare information. Most often, information about provider characteristics and services was presented by using words and numbers only. Graphical formats and symbols were frequently applied as well, usually to present quality information. The most frequently applied symbols were stars (on 15 websites; 36%; see Figures 4.1 and 4.4) and round icons (on 10 websites; 24%; see Figure 4.2). The numbers of stars, round icons and other symbols differed both across and within websites: five, four and three symbols were most frequently found. Furthermore, it was quite common (on 18 websites; 43%) to use bar charts to present quality information.

Rationale for presentation formats

In total, 10 of the 42 websites (24%) returned a completed survey. Of these 10, the most common rationales for the presentation formats used were expert opinion and tests with consumers and/or other stakeholders (both found on 7 websites; 70% of the responding websites) (see Table 4.2).

Discussion and conclusion

Principal results

We have reviewed 42 websites providing public comparative healthcare information, and analyzed the presentation approaches of different information types. The general conclusion is that a wide variety of presentation approaches are used on the Web-based reporting systems, in particular with respect to the integration of different information types and information display. The two extreme options to integrate information types were most often found: providing no integrated information at all and a high level of integration in a single table. Between these two extremes, different options to either separate or integrate the information types were applied. Although different presentation formats were found, some standard elements emerged as well. On most websites, for example, tabular formats were used that presented providers in rows and indicators in columns. The majority of information was provided hierarchically, with options to get an overall sense of performance provided first and options to get more detailed information provided subsequently. This format seemed necessary to manage the total amount of available information.

Study limitations

Our study was intended to provide an impression of existing presentation approaches of comparative healthcare information. Clearly, not all aspects related to information presentation have been systematically reviewed. Although it is beyond the scope of the current study, it is important to keep in mind that the quality of the information itself has not been assessed. Websites may vary on the quality of the information collected and presented. We believe, however, that the current study results provide insight into the state of the art concerning the presentation of comparative healthcare information in the late 2000s. Our study might be limited by the fact that the search strategies were performed solely by native speakers of Dutch. The number of websites per country might be biased toward including more Dutch websites. And, in general, the numbers of websites found per country may be partly influenced by each author's mastery of the different languages included in the search. We only captured Western websites, and the results should therefore be interpreted as only representative of Western websites. Another limitation is the fact that the response rate of the survey was very low. Because of this low response rate, we had limited insight into how information was tested and what consumers' reactions were. From the returned surveys it appeared that consulting experts and tests with consumers were important methods to select presentation formats. It is unknown whether these methods are representative of those used for development of the other websites included in the study.

Discussion

Regarding the usefulness of comparative information for consumers, several results related to the reviewed presentation formats are worth discussing further. First, the standard use of tabular formats to structure the information is important. On the investigated websites, the use of rows for providers and columns for attributes was the typical format for displaying summary information, whereas the opposite display format was used for more detailed information (after selection or drill down paths). It would be relevant to determine whether it makes a difference for consumers to see either providers or attributes in rows. It is known that consumers use both holistic processing (providers first) and dimensional processing (attributes first), with a slight preference for the latter (Russo and Dosher, 1983). Swait and Adamowicz (2001) argued that the more complex information is, the simpler the heuristics that are used, which results in readers focusing more on alternatives (providers) than on attributes. From these findings we conclude that it is not the direction of the information display that is particularly important, but rather the information complexity in the table. Given the fact that most consumers will probably view only summary information, these tables should thus contain graspable numbers of providers and attributes. Otherwise, consumers will not concentrate on the attribute information even though this is the information which has been provided to support their decisions.

A second important aspect to consider is the variety of information display options found on websites. Words as well as numbers were frequently used to present comparative information. It is striking that numbers were displayed on so many websites, although it is known that consumers have difficulty evaluating them (Hibbard and Peters, 2003). As recently demonstrated by Peters and colleagues (2009), numbers do not have evaluative meaning to consumers. On a large number of the websites, however, (some of) the information was presented by using symbols. Hibbard and colleagues (2003; 2002a) argued that visual cues such as stars increase the evaluability of information, because these cues help consumers to sort providers into categories of better and worse. Furthermore, symbols might more easily attract attention compared with numbers and words, similar to pictorial information (Mitchell, 1983; Jae and Delvecchio, 2004). Pictures seem to promote more holistic and integrative strategies to process information than do words (Holbrook and Moore, 1981). However, when there is text-symbol incongruity, symbols may decrease message comprehension, especially among consumers having low literacy (Jae, Delvecchio, and Cowles, 2008). In an experiment by So and Smith (2004), symbols (smiley faces) added to tabular information did not facilitate consumers' decision accuracy. Future research on comparative healthcare information should include similar experiments and examine the impact of symbols. The use of stars, which were frequently found on the reviewed websites, may be an effective presentation format of comparative healthcare information. More research is needed to confirm this.

Third, attention should be focused on the integrated presentation of different information types. To our knowledge, there are no studies that examined the effects of integration levels of different information types. Hence, we cannot make scientifically based inferences about how the different degrees of integration found on the websites included either support or impede informed decision making. Compared with the 1996 review of McCormack et al. (1996) who analyzed the content of comparative healthcare information, it is eminent that more 'objective' performance indicators are dominant in the current review (included in 88% of the reviewed websites). In the findings of McCormack et al. (1996), such performance indicators were included in 10 out of 24 (24%) reporting systems, all in combination with consumer assessment data.

Despite the lack of evidence for consumer reactions, some arguments about the advantages and disadvantages of integrating information types can be made. One important benefit of a high level of integration is that all information can be viewed in an overview at the same time. This may contribute to a sense of clarity and to better coping with a large amount of information. A drawback is that such an overview cannot take up too much space on Web pages, and that the chance that a page will contain contradictory information increases. In addition, more specific information will be lost or difficult to find for consumers, and the flexibility to apply different search strategies diminishes. The opposite of no or very limited integration can, however, also bring about negative consequences. For example, consumers may not see a large part of the information at all, or may fail to notice important information elements. In addition, consumers may need to undertake many steps in the process of viewing information, although it is known that consumers prefer to see information on one webpage (Gerteis et al., 2007). An approach advocated by Harris-Kojetin et al. (2001) is to help consumers to think about their own priorities in the major dimensions of healthcare. This approach of using self-selection menus could be applied to assess whether consumers are more focused on (technical) outcomes of healthcare or more focused on aspects related to trust in healthcare. The fact that these two healthcare consumer profiles can be distinguished among different patient groups (Groenewoud, 2008) may be used as an argument for low levels of integration of different information types. However, the approach of self-testing consumer preferences assumes that consumers have stable preferences, although we know that consumers often construct these preferences while viewing information (Slovic, 1995). All in all, the issue of integrating different information types remains an important topic for further discussion and, importantly, for future research on healthcare information. In our opinion, a certain level of integration is necessary, to prevent consumers overlooking important information or getting stuck in too many decision steps.

A fourth topic for further discussion is the role of contradictory information, which appears to be inherent in comparative healthcare information. As stated, a higher integration of different information types increases the chance that contradictory information must be processed. It is usually assumed that conflicting information increases task complexity. Psychological theories such as cognitive dissonance theory (Festinger, 1957) suggest that when people meet aspects of their decision environment that are incompatible with each other, they attempt to reestablish consistency by transforming some of the incompatible elements. The activities associated with this restoring process are known to demand elaboration (Houston, Childers, and Heckler, 1987), and will probably lead to distress as well. Individuals tend to avoid conflict or to avoid choosing at all when choices become more complex (Keller and Staelin, 1987; Tversky and Shafir, 1992; Dhar, 1997a; Dhar, 1997b; Zhang and Mittal, 2005). In addition, there is a higher change individuals will use simpler choice heuristics (Swait and Adamowicz, 2001). At this time, it remains unclear how to deal with the issue of contradictory information. It is important that future studies search for comprehensible presentation formats that facilitate correct processing of contradictory information. Meanwhile, website managers should be careful not to present information that includes many contradictory elements.

Finally, we want to address the large amount of information we found on websites. It is known that today's consumers are often overloaded with information. Different effects of information overload have been described in the literature. Importantly, a large amount of information can lead to low quality of consumers' choices (Keller and Staelin, 1987) and to less purchasing (Iyengar and Lepper, 2000). Lurie (2004) showed that the amount of information that needs to be processed not only depends on the number of alternatives and attributes in a choice set, but also on the number of attribute levels and the distribution of attribute levels across alternatives. To control the amount of information on websites, it seems necessary to provide only limited numbers of providers and attributes to consumers, as was already suggested concerning information complexity. When a large variety of attribute levels are shown, Web designers and research staff should note the increasing complexity and search for alternative options to display information. Drill down paths can be used to layer information and to comprehensibly provide a large amount of information, as was done on many websites reviewed in this study. Furthermore, it may be necessary to inform consumers on the home page about the amount of information that can be viewed on the website. Consumers will then be better prepared and perhaps less discouraged when they attempt to access the information. Future research should focus on the amount of information that consumers are able and willing to process.

With the current descriptive study, we have shed some light on the decision environment of healthcare consumers in a period of market-based, consumer choice-driven healthcare sectors. We believe that more transparency about the effectiveness of the chosen formats on websites is greatly needed; currently it is largely unclear which rationales are used to select them. Evidence-based quality criteria for presentation approaches should be formulated, and future research can assess how different websites meet these criteria. Moreover, research is needed on other aspects of the decision environment, such as consumers' considerations and motivations to achieve a (good) decision and their decision strategies. Consumers highly motivated to search for good performance might be less distressed by complex information presentation than people who do not care to actively choose healthcare in any case. More generally, the design of websites should be linked to theoretical models of consumer decision making and communication technology. In our opinion, it is a challenge for Internet research to create more manageable comparative healthcare information that is actually used by consumers. Current presentation approaches on websites do not seem to be systematically selected. Website managers should not just release data on the web, but instead should become aware of the many complexities inherent in the comparative information they are providing.

5

Consumers' interpretation and use of comparative information on the quality of healthcare: the effect of presentation approaches

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Introduction

Following other countries like the United States and the United Kingdom, consumer choice has become a critical element of current healthcare reform in the Netherlands (Maarse and Ter Meulen, 2006). Enhanced consumer choice should contribute to a more demand-driven healthcare system. In theory, individual responsibility and informed decision making could enforce an important role for healthcare consumers in the healthcare market (Bernstein and Gauthier, 1999; Marshall and Davies, 2001; Berwick, James, and Coye, 2003; Hibbard, 2003). One important condition for effective decision making is that consumers are provided with reliable and accurate comparative information on healthcare performance (Hibbard, 2003; Mannion and Davies, 2002; Shaller et al., 2003).

Several efforts have been made to assemble and present comparative healthcare information. In addition, an increasing number of performance measurements have become standardized concerning used questionnaires and data collection methods. A good example is the Consumer Assessment of Healthcare Providers and Systems (CAHPS) in the United States (Hargraves, Hays, and Cleary, 2003), based on consumers' own quality assessments. In the Netherlands, Consumer Quality Index (CQ-index or CQI) instruments have been developed to measure and present consumer experiences in healthcare (Stubbe, Brouwer, and Delnoij, 2007; Stubbe, Gelsema, and Delnoij, 2007). These instruments are partly based on American CAHPS questionnaires and partly on Dutch QUOTE instruments (QUality Of care Through the patient's Eyes) (Sixma et al., 1998). Like CAHPS and QUOTE, CQI instruments assess patients' experiences with healthcare, rather than their satisfaction. CQI information about patients' experiences is presented to consumers on the Internet in the form of comparative information to facilitate and stimulate their choices in healthcare. The use of CQI information in decision making should contribute to a more demand-driven healthcare market, and ultimately improve the healthcare system's efficiency and quality. Besides consumers, healthcare providers are encouraged to use CQI information in quality improvement initiatives, a pathway to improving healthcare quality that seems to be effective (Fung et al., 2008).

The dissemination of consumer experience information and other healthcare quality information has, however, so far had little impact on consumers' active use of it (Hibbard and Jewett, 1997; Chernew and Scanlon, 1998; Harris, 2003; Fung et al., 2008). Despite some findings that consumers have positive attitudes towards and interest in healthcare quality information (Hibbard and Jewett, 1996; Tumlinson et al., 1997; Trisolini and Isenberg, 2007), there is only marginal evidence that consumers actually want to use the information (Robinson and Brodie, 1997; Booske, Sainfort, and Hundt, 1999; Marshall et al., 2000; Marshall and Davies, 2001; Schneider and Lieberman, 2001; Magee, Davis, and Coulter, 2003; O'Meara et al., 2005; Abraham et al., 2006; Marshall et al., 2006). Some research findings suggest that new or unsatisfied patients are interested in the information (Schultz et al., 2001; Harris, 2003; Jin and Sorensen, 2006). The inability, unwillingness or disinterest of a great part of the public could result from inadequacies in the presentation of the information (Veroff et al., 1998; Berwick, James, and Coye, 2003, Harris-Kojetin et al., 2001; Hibbard et al., 2001b; Variana and McGlynn, 2002; Hibbard, 2003; Peters et al., 2007b; Fung et al., 2008). Studies show that consumers do not easily comprehend comparative healthcare information (Hibbard and Jewett, 1997; Hibbard, Slovic, and Jewett, 1997; Goldstein and Fyock, 2001; Hibbard et al., 2001b; Magee, Davis, and Coulter, 2003; Marshall et al., 2003; O'Meara et al., 2005; Peters et al., 2007b).

As opposed to the rapid standardization of quality measurements in healthcare, uniformity regarding the presentation of the information has not yet been established (Marshall et al., 2003; Carlisle, 2007). Star ratings are a common visual display of provider performance information in different countries, but other symbols have been applied as well. Symbols such as stars sometimes reflect provider performance relative to an overall performance across providers (relative scores), but stars based on absolute provider performance are also frequently used. Besides the use of symbols, quality information is often presented by horizontal bar graphs using absolute frequencies or percentages of consumers' responses to questionnaires, with longer bars usually meaning better performance. Another aspect that varies across websites is the amount of different types of information presented. On some websites, information based on consumer experiences is presented simultaneously with information based on clinical performance indicators. On the other extreme, different aspects of consumer experience information are presented on separate pages each.

From research on consumer decision making in other sectors we know that the way information is presented strongly influences consumers' responses. Effects of information presentation formats have been found among a wide range of consumer markets, such as packaged supermarket products (Russo, Krieser, and Miyashita, 1975; Bettman and Kakkar, 1977; Biehal and Chakravarti, 1982), electronics (Painton and Gentry, 1985; Shen and Hue, 2007), and restaurants (Jarvenpaa, 1989). For example, presenting verbal or numerical data induces different types of information processing (Russo and Dosher, 1983; Lindberg, Gärling, and Montgomery, 1991; Shen and Hue, 2007). Concerning the healthcare market, such effects have also been found: providing visual cues in the form of stars and ordering by performance facilitated consumers' comprehension and use of the information (Hibbard et al., 2001a; Hibbard et al., 2002a). In addition, information about diseases and symptoms presented as frequencies or as probabilities provoke distinct responses (Yamagishi, 1997; Hoffrage et al., 2000). Consequently, the notion that presentation of healthcare information is important has steadily gained ground (Hibbard and Peters, 2003; Ancker and Kaufman, 2007). Simply providing consumers with more comparative healthcare information is not sufficient to increase the use of it, because choices in healthcare require complex cognitive reasoning (Payne, Bettman, and Johnson, 1993; Slovic, 1995; Hibbard, Slovic, and Jewtt, 1997).

To date, only a few studies have examined the effects of different presentation approaches of comparative healthcare information on consumers' responses. Systematic controlled experiments using different presentation formats have been infrequent in this field, and, with some exceptions (Schultz et al., 2001), studies have not elaborated on information based on consumer experience. As a result, it remains unclear how existing features of presentation approaches such as the type and number of stars influence consumers' comprehension and use of this kind of information. Considering that consumers have difficulty interpreting and using the information, it is a challenge to create effective presentation of this relatively new type of consumer information, that will be actually used in decision-making. Furthermore, it seems important to examine the effects of consumer characteristics, such as age sex and education, to assess how the information is processed and used by different consumer groups.

In the present study, we investigated which presentation features contribute to a correct interpretation and effective use of Dutch CQI information on home care concerning provider performance on the quality aspect *good contact with clients*. This quality aspect is an aspect that is typically considered important by patients in the evaluation of healthcare, and therefore a standard part of CQI questionnaires and other consumer experience instruments. Someone who is searching for a home care provider can view on the Internet how other clients of different home care providers have experienced the contact with the home care nurses. Better presentation approaches might help healthcare consumers (people needing home care or their children) to more correctly interpret and use this kind of information.

We consider *correct interpretation* as the ability to derive correct conclusions from the information about who performs well and who does not. By *effective use* we mean the ability to choose the best performing provider. Correct interpretation is considered a key ability to use information properly, and particularly the effective use measure relates to actual behavior on the healthcare market. If consumers more often choose best performing providers, they will receive better quality of care. We investigated the effects of presenting bar charts and star ratings, ordering of the data, type of stars, number of stars and inclusion of a global rating of overall performance. These presentation features are actually used on the Internet to present Dutch CQI information and healthcare quality information in other countries. The inclusion of a global rating was of interest in the broader context of presenting different types of information at the same time, which often leads to conflicting performance information. For example, a healthcare provider can have a good overall performance, but a relatively bad performance on a particular aspect such as communication with clients. Since presentation formats of comparative healthcare information on the Internet consist of combinations of presentation features, we also examined several interaction effects. It could be, for example, that a certain combination of features, such as five stars reflecting absolute provider performance, particularly supports consumers. Besides the effects of presentation features, the influence of respondents' age education and sex was examined. As we did not have any hypotheses about whether particular presentation features would have differential effects on the responses of consumer subgroups, interactions between presentation features and respondent characteristics were not tested. Our research question was: *"Which presentation features contribute to consumers' correct interpretation and effective use of comparative information on the quality of healthcare?"*

Methods

Study design

Using the conjoint analysis methodology (Ryan and Farrar, 2000), we tested five presentation features:

1. A combination of bar charts and star ratings versus only star ratings (display);
2. An alphabetical ordering of providers versus a rank ordering of performances (ordering);
3. Stars based on absolute performance versus stars based on relative performance (type of stars);
4. Three stars versus five stars (number of stars);
5. Inclusion of a global rating of healthcare providers or not (global rating).

We chose these variables based on previous research and the content of the official Dutch government-sponsored website presenting comparative healthcare performance information (www.kiesBeter.nl). All tested features and their levels are shown in Table 5.1.

Table 5.1 Presentation features and their levels

Feature	Level	Content	Explanation
Display	1	Combination bar chart and stars	Bar charts with percentages of consumers' responses presented in combination with star ratings reflecting provider performance
	2	Bar chart only	Bar charts with percentages of consumers' responses
	3	Stars only	Star ratings reflecting provider performance
Ordering	1	Ordering by performance	Rank order from high performing to low performing provider
	2	Ordering by alphabet	Ordering by alphabet (A-E and V-Z)
Type of stars [a]	1	Relative stars	Star ratings based on mean performance of the particular provider, relative to overall mean performance across all providers
	2	Absolute stars	Star ratings based on absolute mean performance of the particular provider
Number of stars [a]	1	Three stars	* * *
	2	Five stars	* * * * *
Global rating	1	Inclusion global rating	Additional global rating of the provider (0-10 response scale), independent of the performance on 'good contact with clients'
	2	No inclusion global rating	No additional global rating of the provider

[a] Not relevant for the presentation formats with bar chart only.

The combination of all features and levels resulted in a total of 32 experimental formats. We reduced this number to a manageable level by drawing a sample: we constructed a fractional factorial design (Orthoplan in SPSS 14.0) of eight formats, which contained an orthogonal subset of the 32 formats. In addition to this subset, all four formats with the level *bar chart only* and three formats needed to assess the interaction effects were added to the design. This resulted in a total of fifteen experimental formats to be tested. We focused on both main effects and three interaction effects of the presentation features. The interaction effects of interest were:

1. An interaction between display and ordering;
2. An interaction between display and global rating;
3. An interaction between type of stars and number of stars.

Materials

We used fictitious but realistic CQI data to construct the experimental formats of comparative quality information. Each format consisted of a comparison of five home care providers, which were named A, B, C, D, E in one half of the formats, and V, W, X, Y, Z in the other half of the formats to control for potential habituation effects. We presented provider performance on one specific quality aspect of the CQI Home Care instrument, namely *good contact with clients* (provider-client interaction). This quality aspect is commonly used as part of information based on consumer experience, and is composed of questionnaire items about the interaction between clients and the nurses that provide healthcare at clients' homes. For example, it informs about the respectful treatment by home care nurses, their willingness to talk with the client and whether they listen carefully to the client. The answering categories were: *'never', 'sometimes', 'usually',* and *'always',* with *'never'* as most negative experience and *'always'* as most positive experience. The information was designed according to the style of the Dutch website on comparative healthcare information www.kiesBeter.nl. Examples of three experimental formats are shown in Figures 5.1 to 5.3.

Figure 5.1 Example of experimental format: a combination of bar chart and star ratings, a rank ordering of providers, stars based on relative performance, three stars, and no inclusion of a global rating

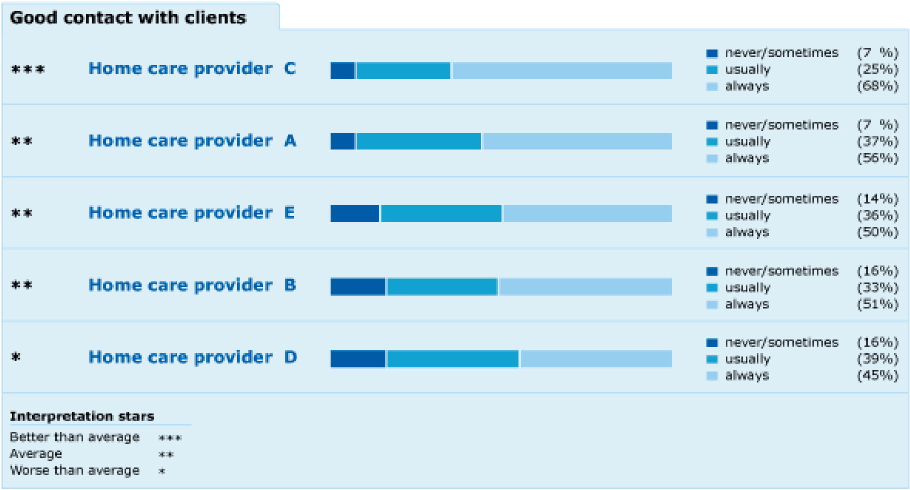
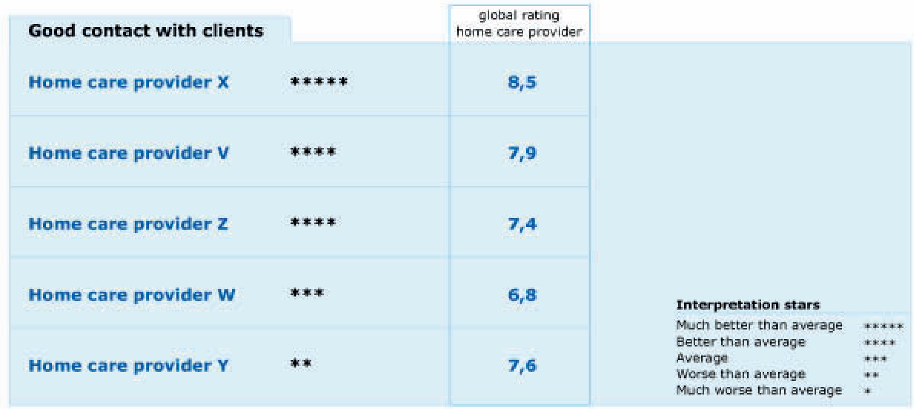


Figure 5.2 Example of experimental format: only star ratings, a rank ordering of providers, stars based on relative performance, five stars, and an inclusion of a global rating

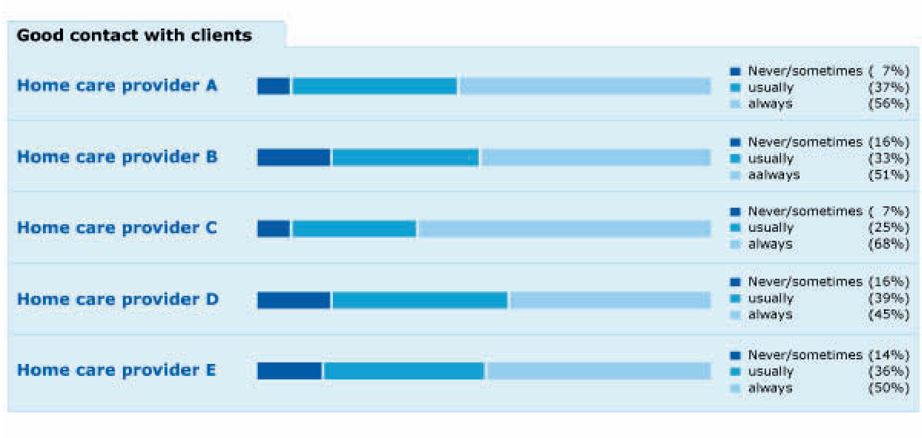


Good contact with clients		global rating home care provider
Home care provider X	*****	8,5
Home care provider V	****	7,9
Home care provider Z	****	7,4
Home care provider W	***	6,8
Home care provider Y	**	7,6

Interpretation stars

Much better than average	*****
Better than average	****
Average	***
Worse than average	**
Much worse than average	*

Figure 5.3 Example of experimental format: only bar chart, an alphabetical ordering of providers, and no inclusion of a global rating



Variables

Respondents watched the information on a computer screen and were confronted with four randomly chosen formats out of the fifteen selected formats, and thus with a subset of all possible combinations of presentation features. We asked respondents to imagine that they were choosing a home care provider for themselves or for someone close to them. Below each presented format, questions on consumers' *general comprehension*, *correct interpretation,* and *effective use* were formulated. The questions on *general comprehension* were used to assess how the presented information was generally comprehended and referred to what was exactly stated in the presented information. For example, we asked *"For which home care provider do clients most often state that there was always good contact with them?"* and *"According to clients, which home care provider performs satisfactory concerning contact with clients?"* We did not assess the influence of presentation features on these variables, since the nature of the comprehension items (which refer to the actual content of information and thus differs across formats) does not allow to test the effects in our design.

We then had respondents answer a series of questions on *correct interpretation* and *effective use* of the presented information, which were used to test the effects of the presentation features. The questions on *correct interpretation* were intended to assess consumers' abstract ability to identify good and bad performance, and were as follows: *"In your opinion, which home care provider has the best contact with clients?"* and *"In your opinion, which home care provider has the worst contact with clients?"* To assess the *effective use* of information, we asked respondents which home care provider they would choose, given a situation in which they would need home care: *'Which home care provider would you choose?'* A choice for the best performing provider is considered an 'effective' choice (*effective use*).

All data were unambiguous concerning performance on *good contact with clients*, with one provider having the highest score. The dichotomous score on each item indicated whether the question was correctly (1) or incorrectly (0) answered. Concerning the *effective use* of the information, this score indicated whether the best performing provider was chosen (1) or not (0). After presenting the four presentation formats, we assessed several demographic characteristics (age, education, sex, health status, ethnicity, language spoken at home), current healthcare information seeking, internet use, and experience with home care to evaluate the composition of the study population.

Sample

Participants between 18 and 85 years were drawn from a Dutch online access panel. New panel members were approached, until each format was rated by approximately 100 respondents. Quota sampling was used to ensure even distributions of age, sex and educational level across the different presentation formats, and these distributions corresponded to the distributions in the Dutch population. In the end, a sample of 2,052 consumers was approached for participation.

Analyses

First, we conducted descriptive analyses to assess how the information was generally comprehended, interpreted and used. Second, multilevel logistic regression analyses were used to assess the effects of the presentation features and the consumer characteristics age education and sex on *correct interpretation* and *effective use*. Multilevel analyses take into account the hierarchical structure of the data; in our repeated measures design the responses are not independent from each other but nested within consumers. For more detail on the multilevel analyses, we refer to the appendix 5.1.

Results

Participant characteristics

A total of 438 (21%) of 2,052 persons completed the questionnaire. 165 (8%) subjects started the questionnaire, but did not complete it. Table 5.2 shows the characteristics of the study sample of 438 consumers. The majority of the respondents was aged between 35 and 54, with almost 17 percent rating their general health as fair or poor. 130 (30%) of the respondents stated that they had searched for information about healthcare providers before. The most frequently cited information sources were the Internet (54%) family and friends (25%) and doctors (22%). Concerning the use of home care, 106 (24%) respondents indicated that they had made use of home care in the past, and 245 (56%) consumers stated that their family or friends had made use of home care in the past.

Age, education and sex of the non-respondents and persons who stopped filling out the questionnaire (non-completers) are also displayed in Table 5.2. The mean age of respondents (46.9 years) differed significantly from the mean age of non-respondents (41.0 years; F=80.31; p<0.001), but not from the mean age of non-completers (47.8 years; F=0.47; p=.49). Non-respondents were more often female than respondents (χ^2= 20.78; p <0.001). Again, respondents and non-completers did not differ from each other (χ^2=0.001; p=0.51). Concerning education, non-respondents and non-completers were more often lower educated, and less often in the middle category of education than respondents (χ^2=25.78; p<0.001).

Table 5.2 Participants' characteristics

Variable	**Respondents**	**Non-respondents**	**Non-completers**
Age:			
18 - 34	77 (17.6%)	392 (27.0%)	26 (15.8%)
35 - 54	230 (52.5%)	869 (60.0%)	85 (51.5%)
55 or older	131 (29.9%)	188 (13.0%)	54 (32.7%)
Sex:			
female	211 (48.2%)	876 (60.5%)	80 (48.5%)
male	227 (51.8%)	573 (39.5%)	85 (51.5%)
Educational level:			
low	154 (35.2%)	680 (46.9%)	81 (49.1%)
middle	172 (39.3%)	407 (28.1%)	47 (28.5%)
high	112 (25.6%)	362 (25.0%)	37 (22.4%)
Self rated overall health status:			
excellent	36 (8.3%)		
very good	99 (22.5%)		
good	230 (52.5%)		
fair	58 (13.3%)		
poor	15 (3.4%)		
Ethnicity:			
non-Dutch	24 (5.5%)		
Dutch	414 (94.5%)		

- table 5.2 continues -

- table 5.2 continued -

Variable	Respondents	Non-respondents	Non-completers
Language spoken at home:			
Dutch	413 (94.3%)		
Dutch dialect	16 (3.7%)		
non-Dutch	9 (2.0%)		
Search for information healthcare providers:			
searched for all information	69 (15.8%)		
searched for some information	61 (14.0%)		
did not search for information	307 (70.2%)		
Use of internet:			
daily use	408 (93.1%)		
several times per week	28 (6.3%)		
once per week	3 (0.6%)		
Visit www.kiesBeter.nl:			
yes	71 (34.1%)		
no	122 (58.6%)		
don't know	15 (7.2%)		
Use of home care:			
made use of domestic care	44 (10.0%)		
made use of nursing care	34 (7.9%)		
made use of both domestic and nursing care	28 (6.3%)		
no use of home care	328 (74.8%)		

Incorrect responses

Table 5.3 shows the number of correct and incorrect responses to all questions in the study. Since each participant responded to four formats, we analyzed 1,752 (4 * 438) cases. The percentage incorrect responses varied from 3% to 52% across the items, with an average percentage of 23%. 12% of the respondents did not choose the best performing home care provider. When examining the correct and incorrect responses per individual, the percentage incorrect responses varied from 4% to 94%, with an average of 27% mistakes per respondent.

Table 5.3 Correct and incorrect responses to the items; N=4*438=1,752

Dependent variable	**Item**	**Incorrect answer N (%)**	**Correct answer N (%)**
Comprehension 1	At which home care provider do clients most often state that there was always good contact with them?	131 (11.3%)	1031 (88.7%)
Comprehension 2	At which home care provider do clients least often state that there was usually good contact with them?	574 (49.4%)	588 (50.6%)
Comprehension 3	According to clients, which home care provider performs more than satisfactory concerning contact with clients?	180 (51.6%)	169 (48.4%)
Comprehension 4	According to clients, which home care provider performs satisfactory concerning contact with clients?	142 (40.7%)	207 (59.3%)
Comprehension 5	According to clients, which home care provider performs average concerning contact wtih clients?	113 (31.5%)	246 (68.5%)
Comprehension 6	According to clients, which home care provider performs worse than average concerning contact with clients?	57 (15.9%)	302 (84.1%)
Comprehension 7	According to clients, which home care provider performs very well concerning contact with clients?	7 (3.1%)	222 (96.9%)
Comprehension 8	According to clients, which home care provider performs unsatisfactory concerning contact with clients?	45 (19.7%)	184 (80.3%)
Comprehension 9	According to clients, which home care provider performs better than average concerning contact with clients?	43 (12.0%)	314 (88.0%)
Comprehension 10	According to clients, which home care provider performs worse than average concerning contact with clients?	69 (19.3%)	288 (80.7%)
Interpretation 1: Best performance	In your opinion, which home care provider has the best contact with clients?	141 (8.0%)	1611 (92.0%)
Interpretation 2: Worst performance	In your opinion, which home care provider has the worst contact with clients?	464 (26.5%)	1288 (73.5%)
Effective use (Choice)	Which home care provider would you choose?	204 (11.6%)	1548 (88.4%)

Presentation features effects

The results of the multilevel regression analyses are shown in Table 5.4. Some presentation features significantly affected consumers' responses. Consumers' indication of the worst provider (*correct interpretation*) was positively influenced by presenting a combination of bar chart and star ratings, compared to stars only. Including a global rating for the home care provider showed a negative influence on respondents' indication of the worst performing provider. The indication of the best provider (*correct interpretation*) was not affected by any of the presentation features.

Two presentation features were related to consumers' *effective use* of the information. First, when ordering by alphabet respondents more often chose the best performing provider, compared to an ordering by performance. Second, the number of stars affected consumers' choice for a home care provider, with three stars being more facilitating than five stars. For the type of stars and the included interaction terms no effects on any of the outcome variables were found.

Table 5.4 Results of multilevel analyses; regression coefficients with standard errors added in parentheses

	Interpretation 1 (best provider) N=1752	**Interpretation 2 (worst provider) N=1752**	**Effective use (choice) N=1752**
Intercept	2.78 (0.13)*	1.29 (0.09)*	2.32 (0.11)*
β Age 35-54 [1]	-0.48 (0.41)	-0.25 (0.24)	**-0.85 (0.38)***
β Age >55 [1]	**-1.17 (0.47)***	**-0.66 (0.28)***	**-1.33 (0.43)***
β Sex[1]	0.30 (0.29)	0.09 (0.18)	0.28 (0.25)
β Average education [1]	0.52 (0.27)	**0.37 (0.18)***	0.31 (0.24)
β High education [1]	0.22 (0.37)	0.44 (0.23)	0.34 (0.34)
β Display [1]	0.08 (0.21)	**0.43 (0.15)***	0.03 (0.19)
β Ordering [1]	0.23 (0.21)	0.15 (0.13)	**0.51 (0.19)***
β Type of stars [1]	-0.02 (0.27)	-0.16 (0.18)	0.26 (0.23)
β Number of stars [1]	0.13 (0.34)	0.23 (0.23)	**0.77 (0.31)***
β Global rating [1]	-0.32 (0.21)	**1.81 (0.14)***	-0.26 (0.18)
β Display * Ordering	-0.60 (0.54)	0.35 (0.39)	-0.63 (0.46)
β Display * Global rating	-0.26 (0.47)	-0.25 (0.30)	0.37 (0.41)
β Type of stars * Number of stars	0.25 (0.53)	0.44 (0.32)	0.31 (0.48)

[1] Reference group age=18-34 years; reference group sex=men; reference group education=low education; reference group of display=stars only; reference group ordering=rank ordering by performance; reference group type of stars=relative stars; reference group number of stars=five stars; reference group global rating=inclusion of global rating.

* $p<0.05$.

Consumer characteristics effects

In general, older people and less educated people had more difficulty processing the information than younger people and higher educated people. Age was negatively associated with both consumers' *correct interpretation* (indicating the best and worst provider) and their *effective use*. Consumers' education was positively related to the indication of the worst provider (*correct interpretation*). Education did not relate to either of the other two outcomes. Consumers' sex was not associated with the outcome variables.

Discussion and conclusion

Conclusion

The aim of this study was to assess the effects of presentation features of Consumer Quality Index (CQI) information about quality of home care on consumers' correct interpretation and effective use of the information. We found that correct interpretation and effective use were partly determined by presentation features. The effects of presentation features differed across the different outcomes. A combination of bar charts and stars, and no inclusion of a global rating facilitated consumers' correct interpretation. Ordering providers by alphabet and using three stars contributed to consumers' effective use. Our study has shown that information presentation formats are important to pay attention to in the context of publishing performance information to consumers. Our findings provide evidence-based suggestions for optimizing the information on the Internet. Concerning information on the quality of home care, the effective presentation features could enforce a more proper use of the information, which, in turn, could play a major role in home care quality improvement.

Discussion

In line with previous studies, our findings show that comparative healthcare information is complex: consumers incorrectly answered a great part of the questions. Particularly older and less educated consumers had difficulty interpreting and effectively using the comparative information. In this study, the average percentage of incorrect answers was 27% per individual. Other studies reported similar percentages (Hibbard et al., 2001a; Hibbard, Stockard, and Tusler, 2005a). An important issue is whether the questions themselves in this study are not too complex for consumers, and whether this might influence their interpretation and use of the material. Such task effects have been found in previous research (Payne, Bettman, and Johnson, 1993).

The finding that stars combined with bar charts improved consumers' correct interpretation compared to stars only is new: previous studies found no significant differences (Hibbard et al., 2001a; Hibbard et al., 2002a). In our study, the effect was only found when consumers had to indicate the worst performing provider, whereas previous studies did not examine this specific capacity of consumers. Notably, an alphabetical ordering of providers facilitated consumers' effective use. This effect was unexpected and contradictory to previous findings in the United States, in which positive effects of ordering health plans by performance on effective use of information was found (Hibbard et al., 2001a; Hibbard et al., 2002a). It could be that American citizens are more accustomed to rankings and league tables, due to a longer tradition in market-based competition, and therefore more inclined to identify the most excellent performance. In the Netherlands, on the other hand, citizens are only now slightly becoming aware of their new role as active consumers in healthcare, and classifying performance might be less familiar to them. Also, existing Dutch websites have thus far presented comparative information using an alphabetical ordering of providers, which might have 'primed' consumers to process information in a particular way. At the current stage, we can only speculate about this somewhat counterintuitive effect. Clearly, more research is needed to further unravel the effect of ordering performance data.

Interestingly, we found differing effects of presentation features on the different outcomes of correct interpretation and effective use of the information. Combining bar charts and star ratings affected consumers' correct interpretation when they had to indicate the worst performing provider, but not their effective use of the information. In contrast, the number of stars and way of ordering the information influenced consumers' effective use of the information, but were not related to a correct interpretation. Apparently, different reasoning processes are used as a result of asking different questions. Perhaps consumers use a more intuitive mode of reasoning when asked to make a choice, and a more analytic mode when asked to evaluate the exact content of the information.

When formulating suggestions for presenting future comparative healthcare information, the findings on all outcome variables should be combined: formats using a combination of bar charts and stars, an alphabetical ordering of healthcare providers and three stars can be used best. Concerning the use of a global rating, we cannot make clear recommendations. Our finding that people less often correctly indicate the worst performing when a global rating is included can probably be attributed to the specific context. That is, the provider who performed worst on good contact with clients was not the worst overall (global rating), which may have been confusing. Consumers might have concentrated on the provider performing worst overall, represented by the global rating. The fact that consumers incorrectly answered the specific question on interpretation does not mean that they incorrectly processed the information or that an inclusion of a global rating cannot be helpful to them.

In the broad context of publishing comparative healthcare information on the Internet, we underline that presentation formats facilitating consumers' use of the information are not always the approaches which are also methodologically sound. For example, the use of star ratings may suggest substantial quality differences between providers and thus seems only legitimate when these differences are at least statistically significant. When using stars based on absolute scores, provider-differences in the number of stars are not necessarily statistically significant. This is difficult to communicate to both consumers and healthcare providers being monitored. But even when differences are statistically significant, the question remains whether they are large enough to be relevant and thus to present to consumers. In practice, even small differences between providers on CQI performance are often significant due to large sample sizes. Consequently, both healthcare policy makers and researchers should carefully consider presentation formats in relation to the provider differences found in profiling studies.

Limitations and further research

The response rate was relatively low (21%), which might have influenced the composition of our sample and therefore biased the results. However, additional batches of questionnaires were sent to specific subgroups of consumers to ensure sufficient response rates of these subgroups. This largely succeeded. Analysis revealed that respondents were somewhat older, higher educated, and more often male than non-respondents.

Importantly, almost half of the people not completing the questionnaire had a low education, underlining that the information and/or questions were difficult for consumers to understand. Our sample contained hardly any consumers with a non-Dutch origin. We recognize that correct interpretation and effective use of the material might be more difficult for lower educated people and people from ethnic minorities than for the persons in our study, for example due to insufficient language skills. Therefore, future research on the use of comparative healthcare information should focus more on non-Dutch speaking populations and lower educated people, and investigate the influence of consumers' reading skills and numeric literacy concerning health information (Donelle, Hoffman-Goetz, and Arocha, 2007; Ginde et al., 2008).

Some of our findings do not correspond to results from previous studies. More research should be performed to investigate which effects can be replicated for different types of comparative healthcare information, other types of quality indicators, different healthcare sectors, and other outcome variables. As noted by Shah and Hoeffner (2002), differences in format effects may be attributed to the fact that each experiment with presentation formats only includes a selection of interpretation tasks. More extensive research is thus needed to formulate more definitive conclusions as to presenting comparative healthcare information. In addition, research in other countries will provide more insight into possible sociocultural explanations for differences in results.

Besides particular presentation features, more general aspects related to the amount and the structure of information are important issues that need further consideration. In our opinion, more qualitative research is needed to assess how consumers construct their meaning or sense of comparative healthcare information (Harris-Kojetin et al., 2001) and how they use different reasoning processes. It would be of interest to know whether consumers actually want to choose best performing healthcare providers, or whether they view comparative information for other reasons (for example to check how their own provider performs). In future studies, it is important to provide consumers with information based on multiple quality aspects or other types of indicators, because the ultimate task for consumers is to process all the information and base their decision on it. Furthermore, future research should investigate whether consumers gradually learn to process comparative healthcare information better.

Appendix 5.1

A multilevel logistic regression model was used to analyze the data. We used MLwiN 2.02, with the PQL first order estimation procedure with constrained level 1 variance. At the higher level we have the individual respondents and nested within the respondents the formats they judged. The model is a standard two level random intercept multilevel model, with predictor variables at both levels which are centered on the sample means. Not all format features are present in all presented formats. In these cases, the variable Z_p ensures that the contribution to the overall regression for this feature is zero.

The model is:

$$y_{ij} = \beta_{00} + \beta_{hp0}((X_{hpij} - \overline{X}_{hp00})Z_p) + \beta_{0q}(X_{q0j} - \overline{X}_{q00}) + \mu_{0j} + \varepsilon_{ij}$$

y = outcome (0,1)
i = format 1 … n
j = respondent 1 … N

β_{00} = intercept parameter
β = regression coefficients

$\beta_{hp0}((X_{hpij} - \overline{X}_{hp00})Z_p)$ = fixed part for the format features
p = format features 1 … p
h = level of feature (p) 1 … h
X_{hpij} = indicator variable for level (h) of feature (p)
0=not present
1=present
$\overline{X}_{hp00}$ = percentages of formats that have this feature present
Z_p = indicator variable which indicates whether the format feature (p) is present in the current format
0=not present
1=present

$\beta_{0q}(X_{q0j} - \overline{X}_{q00})$ = fixed part for the consumer characteristics
q = consumer characteristics 1 … q
X_{q0j} = measurement of the consumer characteristic q
$\overline{X}_{q00}$ = average of the measurement q over all respondents

μ_{0j} = between respondents variance
ε_{ij} = binomial error variance

6

How do healthcare consumers process and evaluate comparative healthcare information? A qualitative study using cognitive interviews

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Background

Following the increased emphasis on transparency and consumer choice in healthcare, much effort has been made to publicly report healthcare performance. The aim is to stimulate informed decision making in healthcare and ultimately to improve healthcare quality. Therefore, comparative healthcare information should be effectively adopted and used by healthcare consumers. There is some evidence that people, particularly unsatisfied or new consumers on the healthcare market, are interested in the information (Schultz et al., 2001; Harris, 2003; Sofaer et al., 2005; Jin and Sorensen, 2006). Nevertheless, several studies have shown that publishing information on healthcare performance has had little impact on consumers' use of it (Hibbard et al., 2002b; Farley et al., 2002a; Farley et al., 2002b). One of the explanations for this lack of use considers that online performance information may be poorly constructed and unadjusted to human information processing strategies (Hibbard, 2003; Schneider and Lieberman, 2001; Fung et al., 2008).

Despite research evidence and conventional wisdom that comparative healthcare information is complex and human processing capacities are limited (Slovic, 1982; Wilson and Schooler, 1991; Dijksterhuis, 2004), providing healthcare consumers with large amounts of (mostly online) public healthcare reports has continued. If we want this kind of information to be more effectively used by consumers, it is necessary that they can easily process the information (Vaiana and McGlynn, 2002). Although there has been research on how healthcare consumers evaluate and use health-related websites (Eysenbach and Köhler, 2002; Adams, De Bont, and Berg, 2006), the specific bottlenecks that consumers face when processing comparative healthcare information have not been thoroughly examined. In addition to studies on design features (Hibbard et al., 2001a; Hibbard et al., 2002a) and website usability, an in-depth understanding of how consumers manage comparative healthcare information is thus needed.

Information processing

From cognitive science and decision making literature, we know how information can be processed by consumers. Broadly, people either think in an analytical (rule-based) or experiential mode (Sloman, 1996). The analytical mode concerns conscious, deliberative, attribute-by-attribute reasoning, which is relatively slow. Dijksterhuis (2004) argued that human consciousness has limited capacity; causing consumers to take into account only a subset of relevant information. Therefore, the analytical mode is usually applied when information is relatively simple. In contrast, the experiential mode consists of more associative, automatic reasoning, occurring relatively fast. People often apply this processing mode, using shortcuts or intuitive heuristics, especially when large amounts of information are concerned (Tversky, Sattah, and Slovic, 1988; Payne, Bettman, and Johnson, 1993; Devetag, 1999). Usually, consumers only scan information (Eysenbach, 2005) looking for information they want (Redish, 1989) and in the light of questions already in mind, their knowledge, and their expectations (Bransford and Johnson, 1972; Wright, 1987).

When it comes to making decisions, several 'decision strategies' (that is, methods whereby decision makers search through the decision problem) have been described in the literature (Payne, Bettman, and Johnson, 1993; Devetag, 1999). Generally, a decision strategy contains a search for the relative importance of attributes, and a specification of cutoff values and preferences across attribute levels. The most common strategies are shortly described in Table 6.1. Decision strategies are often used in combination, for example eliminating poor alternatives in an initial phase, and examining remaining alternatives in more detail in a second phase (Payne, Bettman, and Johnson, 1993).

Table 6.1 Overview of common decision strategies*

Decision strategy	**Short description**
Weighted addititive (WADD)	Taking into account the values of each alternative on all relevant attributes; considering the relative importance of each attribute; multipying weights times attribute values; summing weighted attribute values over all attributes.
Additive difference (ADDIF)	Comparing pairs of alternatives directly on each dimension; determining the differences between subjective values of alternatives on a particular dimension; applying weighting function to each difference and summing results over all dimensions to obtain overall relative evaluation of two alternatives.
Equal weight (EQW)	Choosing on basis of the sum of all values; ignoring information about relative importance.
Elimination-by-aspects (EBA)	Assessing most important attribute; eliminating all options that are not satisfactory with respect to that attribute; repeating for next most important attribute and so on, until there is one option left.
Satisfying (SAT)	Choosing the first option that is satisfactory.

- table 6.1 continues -

- table 6.1 continued -

Decision strategy	**Short description**
Lexicographic (LEX)	Assessing most important attribute; selecting the option that has the best value on that attribute.
Lexicographic semiorder (LEXSEMI)	Assessing most important attribute; selecting the option that has the best value on that attribute; including notion of selecting alternatives that are within just-noticeable difference (JND) of the best alternative.
Majority of confirming dimensions (MCD)	Choosing by comparing pairs of alternatives; winner is compared with the next alternative in the set; simplified version of the ADDIF strategy (only the direction of differences is considered, not the magnitude).
Frequency knowlegde (FRQ)	Counting the number of good and bad features; the option with the smallest numer of bad features or the option with the biggest number of good features is chosen.
Habitual heuristic	Choosing what you chose last time.
Affect referral	Recalling from memory previously formed evaluations for familiar alternatives; choosing accordingly.
Price-oriented	Buying the cheapest product.
In store	Buying the first product you find.

* The decision strategies are based on descriptions in Payne, Bettman, and Johnson (1993) and Devetag (1999).

Choices based on comparative healthcare information typically involve the following demands (Hibbard and Peters, 2003):

1. Processing technical terms and complex ideas;
2. Comparing multiple alternatives on several attributes;
3. Weighting various factors according to individual preferences.

These processes and trade-offs are known to be difficult (Hibbard, Slovic, and Jewett, 1997) and provoke fast and frugal decision making (Gigerenzer and Goldstein, 1996). Furthermore, comparative healthcare information seems to produce preferences that are 'constructed' while sorting through information ('constructed preference') (Slovic, 1995; Sainfort and Booske, 1996). This means that consumers have no fixed ideas about their priorities in healthcare quality, and construct them depending on how information is provided.

To summarize, it is known which general processing strategies can be applied by consumers, but relatively little is known with respect to comparative healthcare information. The literature suggests that it is a complex job to process comparative healthcare information, and Internet research has identified many guidelines to improve website usability. However, hardly any studies have comprehensively examined the information processing strategies of consumers themselves. To be able to understand the difficulties and bottlenecks consumers face, an open, qualitative approach using real online information is therefore needed. With this study, we aimed to gain insight into consumers' own thoughts, interpretations, and evaluations of this kind of information. Our research question was: *"How do consumers process and evaluate comparative healthcare information?"*.

Methods

Cognitive interviews

A descriptive qualitative approach was adopted to explore consumers' thoughts about and interpretations of comparative healthcare information. We chose to investigate the topic qualitatively to be able to understand the experience of consumers themselves and to investigate the relevant themes in-depth. We performed semi-structured cognitive interviews with consumers, who were prompted with existing Dutch comparative healthcare information on a computer screen. Cognitive interviewing is a technique for investigating thought processes people use as they sort through information and make decisions (Beatty and Willis, 2007). To gather rich and detailed information, participants were instructed to think aloud while they viewed the information. Furthermore, we posed open-ended questions about the material using a topic list with standardized themes. Table 6.2 summarizes the content of the interview protocol. Participants were allowed to go through information and surf to web pages behind the initial page.

We performed the interviews in a small, private room, and an assistant made notes during the interview. Interviews were recorded on audio tape with permission of the interviewees. Participants filled out an informed consent form and a questionnaire about demographic variables. After that they were rewarded with a token gift, namely a gift voucher of 15 Euro. Each interview lasted about one hour. The interviews were performed by a team of five researchers, who had a joint instruction before the start of the interviews. After a first round of interviews, interviewers were debriefed on the main findings and aspects to pay attention to in the next set of interviews.

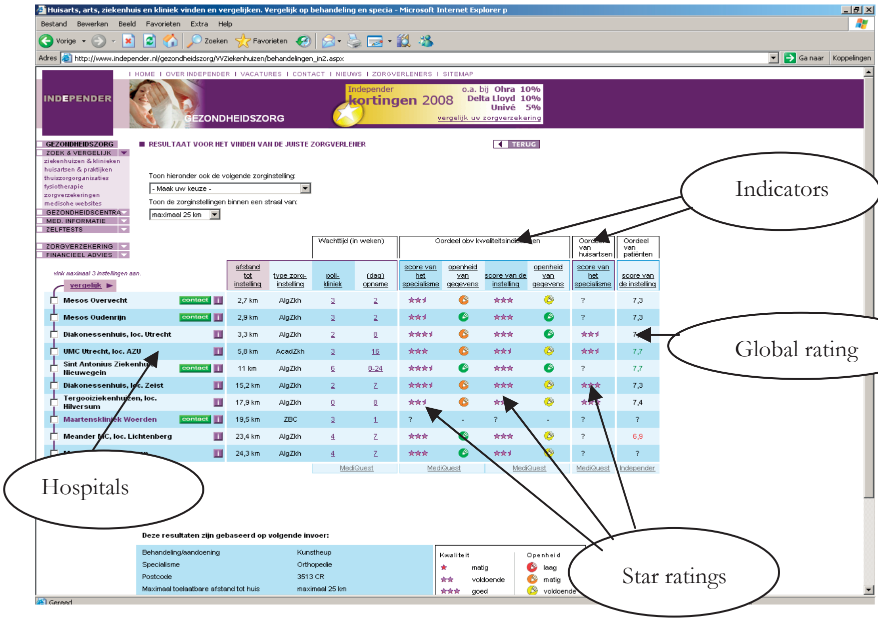
Table 6.2 Summary of the interview protocol

Part of the interview	Key text / questions
Introduction	Today I will show you information about the quality of healthcare on the Internet. We would like to hear your reaction to the information. The purpose of the interview is to let you 'think aloud'. You are encouraged to say anything that comes into your mind. We are interested in all your reactions. Are there any questions before we start?
Part 1: Thinking aloud	Can you tell me what you are thinking as you see this information? Can you tell me what this information is about?
Part 2: Probing	According to you, what is the purpose of this information? What do the presented stars mean to you? Can you explain the term 'personal communication of employees' in your own words? Why do you think that the aspect 'public avalibility of data' is presented to consumers?
Part 3: Choice task	If you would choose a hospital / health plan based on this information (for yourself or for someone close to you), which hospital / health plan would you choose? If you would choose a hospital / health plan based on this information (for yourself or for someone close to you), what would this information mean to you?
Conclusion	Are there any further questions or things you would like to say?

Materials

Participants were provided with three Dutch web pages containing comparative healthcare information as visual prompts: 1) information on the quality of hospital care concerning hip surgery (Figure 6.1 [www.independer.nl]); 2) information on the quality of health plans (Figure 6.2 [www.kiesBeter.nl]); and 3) information on both quality and premiums of health plans (Figure 6.3 [www.consumentenbond.nl]). At the time of the interviews, these websites were relatively well-known public reporting initiatives in the Netherlands. In addition, we chose to test these websites because clinical performance indicators - defined by the Dutch Inspectorate for healthcare (Berg et al., 2005) are presented - as well as patient experience information measured with the Consumer Quality Index (a set of standardized patient surveys) (Stubbe, Gelsema, and Delnoij, 2007). The pages were presented in six different orders (3*2) to control for potential order effects.

Figure 6.1 Comparative information on hospital quality concerning hip surgery (www.independer.nl)



RESULTAAT VOOR HET VINDEN VAN DE JUISTE ZORGVERLENER

Toon hieronder ook de volgende zorginstelling: - Maak uw keuze -

Toon de zorginstellingen binnen een straal van: maximaal 25 km

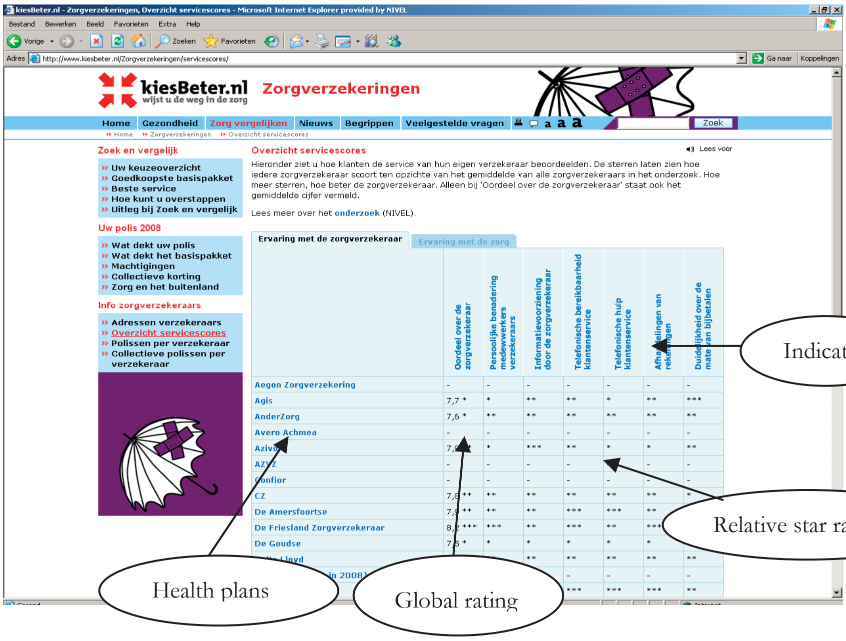
			Wachttijd (in weken)		Oordeel obv kwaliteitsindicatoren				Oordeel van huisartsen	Oordeel van patiënten
	afstand tot instelling	type zorg-instelling	poli-kliniek	(dag) opname	score van het specialisme	openheid van gegevens	score van de instelling	openheid van gegevens	score van het specialisme	score van de instelling
Mesos Overvecht	2,7 km	AlgZkh	3	2	★★½	🟠	★★★	🟡	?	7,3
Mesos Oudenrijn	2,9 km	AlgZkh	3	2	★★½	🟢	★★★	🟢	?	7,3
Diakonessenhuis, loc. Utrecht	3,3 km	AlgZkh	2	8	★★★½	🟠	★★★	🟢	★★½	7
UMC Utrecht, loc. AZU	5,8 km	AcadZkh	3	16	★★★	🟠	★★½	🟡	★★½	7,7
Sint Antonius Ziekenhuis Nieuwegein	11 km	AlgZkh	6	8-24	★★★½	🟢	★★★	🟢	?	7,7
Diakonessenhuis, loc. Zeist	15,2 km	AlgZkh	2	7	★★★½	🟠	★★★	🟡	★★★	7,3
Tergooiziekenhuizen, loc. Hilversum	17,9 km	AlgZkh	0	8	★★½	🟠	★★	🟡	★★★	7,4
Maartenskliniek Woerden	19,5 km	ZBC	3	1	?	-	?	-	?	?
Meander MC, loc. Lichtenberg	23,4 km	AlgZkh	4	7	★★★	🟢	★★★	🟡	?	6,9
M	24,3 km	AlgZkh	4	7	★★★	🟢	★★½	🟡	?	?

Deze resultaten zijn gebaseerd op volgende invoer:

Behandeling/aandoening	Kunstheup
Specialisme	Orthopedie
Postcode	3513 CR
Maximaal toelaatbare afstand tot huis	maximaal 25 km

Kwaliteit		Openheid	
★	matig	🔴	laag
★★	voldoende	🟠	matig
★★★	goed	🟡	voldoende

Figure 6.2 Comparative information on quality of health plans (www.kiesBeter.nl)



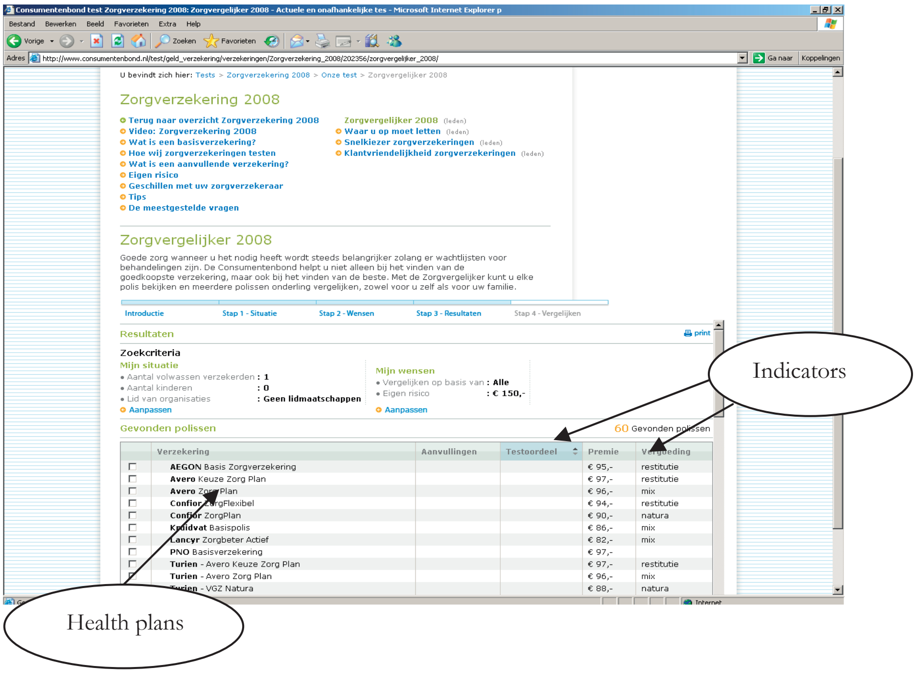
Overzicht servicescores

Hieronder ziet u hoe klanten de service van hun eigen verzekeraar beoordeelden. De sterren laten zien hoe iedere zorgverzekeraar scoort ten opzichte van het gemiddelde van alle zorgverzekeraars in het onderzoek. Hoe meer sterren, hoe beter de zorgverzekeraar. Alleen bij 'Oordeel over de zorgverzekeraar' staat ook het gemiddelde cijfer vermeld.

Lees meer over het onderzoek (NIVEL).

	Oordeel over de zorgverzekeraar	Persoonlijke benadering medewerkers verzekeraars	Informatievoorziening door de zorgverzekeraar	Telefonische bereikbaarheid klantenservice	Telefonische hulp klantenservice	Afhandelingen van rekeningen	Duidelijkheid over de mate van bijbetalen
Aegon Zorgverzekering	-	-	-	-	-	-	-
Agis	7,7 *	*	**	**	*	**	***
AnderZorg	7,6 *	**	**	**	**	**	**
Avero Achmea	-	-	-	-	-	-	-
Azivo	7,8 *	*	***	**	*	*	**
AZVZ	-	-	-	-	-	-	-
Confior	-	-	-	-	-	-	-
CZ	7,8 **	**	**	**	**	**	*
De Amersfoortse	7,9 **	**	**	***	***	**	
De Friesland Zorgverzekeraar	8,2 ***	***	**	***	**	***	
De Goudse	7,5 *	*	*	*	*	*	
Delta Lloyd			**	**	**	**	**
(in 2008)				-	-	-	-
				***	***	***	**

Figure 6.3 Comparative information on quality and premium of health plans (www.consumentenbond.nl)



U bevindt zich hier: Tests > Zorgverzekering 2008 > Onze test > Zorgvergelijker 2008

Zorgverzekering 2008

- Terug naar overzicht Zorgverzekering 2008
- Video: Zorgverzekering 2008
- Wat is een basisverzekering?
- Hoe wij zorgverzekeringen testen
- Wat is een aanvullende verzekering?
- Eigen risico
- Geschillen met uw zorgverzekeraar
- Tips
- De meestgestelde vragen

Zorgvergelijker 2008 (leden)
- Waar u op moet letten (leden)
- Snelkiezer zorgverzekeringen (leden)
- Klantvriendelijkheid zorgverzekeringen (leden)

Zorgvergelijker 2008

Goede zorg wanneer u het nodig heeft wordt steeds belangrijker zolang er wachtlijsten voor behandelingen zijn. De Consumentenbond helpt u niet alleen bij het vinden van de goedkoopste verzekering, maar ook bij het vinden van de beste. Met de Zorgvergelijker kunt u elke polis bekijken en meerdere polissen onderling vergelijken, zowel voor u zelf als voor uw familie.

Introductie Stap 1 - Situatie Stap 2 - Wensen Stap 3 - Resultaten Stap 4 - Vergelijken

Resultaten print

Zoekcriteria

Mijn situatie
- Aantal volwassen verzekerden : 1
- Aantal kinderen : 0
- Lid van organisaties : Geen lidmaatschappen
- Aanpassen

Mijn wensen
- Vergelijken op basis van : Alle
- Eigen risico : € 150,-
- Aanpassen

Gevonden polissen 60 Gevonden polissen

	Verzekering	Aanvullingen	Testoordeel	Premie	Vergoeding
☐	**AEGON** Basis Zorgverzekering			€ 95,-	restitutie
☐	**Avero** Keuze Zorg Plan			€ 97,-	restitutie
☐	**Avero** Zorg Plan			€ 96,-	mix
☐	**Confior** ZorgFlexibel			€ 94,-	restitutie
☐	**Confior** ZorgPlan			€ 90,-	natura
☐	**Kruidvat** Basispolis			€ 86,-	mix
☐	**Lancyr** Zorgbeter Actief			€ 82,-	mix
☐	**PNO** Basisverzekering			€ 97,-	
☐	**Turien** - Avero Keuze Zorg Plan			€ 97,-	restitutie
☐	**Turien** - Avero Zorg Plan			€ 96,-	mix
	Turien - VGZ Natura			€ 88,-	natura

Data collection and sample

We invited a sample of 157 members of a Dutch health plan enrollees panel *(VGZ Insurants Panel)* to participate. The aim of this panel is to gather information on consumers' experiences with and expectations of healthcare in general and their health insurer in particular. Panel members were previously recruited through an announcement in the magazine of health insurer VGZ and are all enrollees of this health insurer. To guarantee panel members' privacy, the panel is managed by the NIVEL; the health insurer is ignorant about who of their enrollees are panel members. The panel is registered by the Dutch Data Protection Authority (no. 1309664). Approval by an ethics committee is not necessary under Dutch law. The 157 panel members were selected by the researchers based on traveling time to the interview location (maximum of 45 minutes) and age (maximum of 85 years). The selected individuals received an invitation letter from the researchers to participate in the present study. In total, 22 consumers (14%) responded, of which 20 actually participated. Table 6.3 shows participants' characteristics.

Table 6.3 Participants' characteristics

Variable	N	%
Age:		
18 - 34	1	5.3
35 - 54	4	21.1
55-64	7	36.8
65-74	6	31.6
>74	1	5.3
General health status:		
excellent	3	15.0
very good	4	20.0
good	10	50.0
fair	2	10.0
poor	1	5.0
Gender:		
female	9	45.0
male	11	55.0
Education:		
low (primary education)	0	0.0
average (secondary education)	9	45.0
high (tertiary education)	11	55.0
Ever visited www.kiesBeter.nl?:		
yes	4	20.0
no	16	80.0
Ever visited www.independer.nl?:		
yes	4	20.0
no	16	80.0
Ever visited www.consumentenbond.nl?:		
yes	8	40.0
no	12	60.0

Analysis

The original audio tapes were transcribed and the transcriptions were analyzed by one researcher. A second researcher independently analyzed a subset of the transcriptions. Both researchers conducted descriptive thematic analysis, consisting of an open coding and an axial coding phase (Strauss and Corbin, 1990; Boeije, 2005). Open coding was characterized by fragmenting (Dey, 1993): relevant themes were extracted, categorized and classified. After the research team verified the themes, relationships between categories were identified in the axial coding phase. Since we were most interested in consumers' own spontaneous interpretations and information processing, we focused on data derived from thinking aloud. Subsequently, we analyzed answers to specific questions. In the descriptions of the emerging themes, we used the following guideline to connote the quantity of how often themes were mentioned (Sandelowski, 2001). *Many*, *often, frequently* and *generally* are used when a theme is mentioned by more than 75% of participants; *common* and *several* when mentioned by about 50% to 75% of participants; *some* when mentioned by about 25% to 50% of participants; *few* when mentioned by less than 25% of participants.

Results

Data analyses resulted in the identification of twelve themes, which are described in this section and illustrated by interviewees' quotes. All quotes were translated from Dutch by the first author, and checked by the second author. We categorized the themes according to the main areas of interest in the study: a response to the design and content of the information (thinking aloud), the purpose of the information (probing), and the use of the information (choice task).

Response to the design

Participants often spoke about the design of the website, focusing on aspects such as the amount of information on one webpage (theme 1), information complexity and organization (theme 2), usability of the webpage (theme 3), and the appearance of the information (theme 4). Participants wanted to go quickly through the information and preferred information that is clear at first sight. Generally, negative comments were made about the amount of information (theme 1), such as the following:

> *How I feel about it? It is too much. I have to consider it line by line. It's too much for one webpage.*
>
> *The number of health plans is overwhelming. You should view all and then wonder "what was at the top?". So you must actually move back and forth. I would not prefer this.*
>
> *Well, I have to go through a lot, based on this information. Because if you have a number of your own criteria, you still got to do a lot of work to specifically find out.*

It is clear that participants felt overwhelmed by the amount of information, which sometimes caused them to stop considering it. It was striking how often consumers said that it was too much immediately after providing them with the information. Some people described their feeling by words as 'overwhelming', 'confused', and 'disorderly'. In contrast, some participants were satisfied with the presented quantity.

Comments were made about the complexity and organization of the design (theme 2):

> *Well, I think that this website appears calm, compared to the other one. It is more conveniently arranged, and has clear components. This really works for me.*
>
> *I mean the structure of the information. I feel that the structure is not straightforward. But that's also a personal matter, I think.*

From these quotes we see that interviewees' evaluation of the complexity was related to how the information was organized. Interviewees also frequently touched upon the usability or user-friendliness of the website (theme 3):

> *I have to read the information vertical. That's very bad, because I have to turn my head.*
>
> *It is not clear that these aspects are clickable.*

These quotes tell us that the vertical display of quality indicators and the clickability of aspects of choice are barriers to an easy use of the information. Other barriers were mentioned as well, namely the absence of an option to fasten text in the upper part of a table while scrolling down, and the ambiguous display and content of mouse-overs.

Concerning the appearance of the information (theme 4), interviewees criticized the layout, type face, and the use of colors, as the following quotes illustrate:

> *I think it is just a messy layout. Letters that don't fit in a box. It is a noisy site, Look, holes and corners are everywhere.*
>
> *This site is nice and open. A lot of white and bright colors. And a large font.*

Response to the content of information

Participants' thoughts focused on different aspects related to the actual information content: the importance of quality indicators (theme 5), the interpretation of information (theme 6), a comparison of the information to their own experiences and ideas (theme 7), and the quality of the presented information (theme 8).

Many interviewees spontaneously attributed importance to the presented quality indicators (theme 5), and further focused on those aspects that they prioritized:

> *I focus on the opinion of family doctors. That's something that I find important. What my family doctor would think about the quality of hospitals.*
>
> *Let's see: I think waiting times are important. I see that hospital A has waiting time period of 7 weeks, which I think is just too long.*

Almost all information was considered important, and some interviewees even wanted more detailed information, which is hard to reconcile with their feelings of being overwhelmed by the amount of information. The following quote nicely illustrates this inconsistency:

> *I'd like to have more background information. What's the meaning of the stars? How much stars are there? What's the purpose of 'performance indicators'? The number of beds? The number of single and double rooms? That can be included in the information. But it has to be more straightforward than it is now.*

Most participants tried to interpret the information, and misunderstood a lot of it (theme 6):

> '*Opinion of ex-patients' means that these patients had a new hip and evaluate whether they are satisfied about it. Perhaps these patients had to fill out a questionnaire about that. But whether these questionnaires are used for this website... I don't know. Perhaps through the Internet. But it contains an opinion on satisfaction, I guess.*
>
> *The bar chart says nothing. It is not clear what this actually means, 'reimbursement of claims'. Then you get scores of never, sometimes, usually, and always. Does this mean that a claim is always reimbursed in one year?*

The second quote illustrates that bar charts were incorrectly interpreted. The scores of never, sometimes, usually, and always actually indicate how often claims were reimbursed correctly. Similarly, interviewees had difficulty interpreting symbols, especially when these were based on relative performance scores (performance that is worse than average, average, or better than average). The association between relative and absolute performance was not always clear, as can be seen in the following quote:

> *Health plan A has one star on all aspects. That's very bad. In my mind, they shouldn't have given one star to a rating of 7.4. That is too high. So, I doubt whether this rating of 7.4 really is an answer of respondents. I don't believe that.*

This participant had trouble to understand that one star means 'a worse than average performance', and not an absolute 'bad performance'. Presenting absolute global ratings simultaneously (7.4) caused confusion.

Furthermore, participants found it hard to understand conflicting information when, for example, some hospitals performed good on one quality aspect, but bad on another aspect. One participant stated,

> *But that's very strange. Look at this. Here we find a contradiction. Look, that can't be possible. The performance of this hospital according to patients is very high. But the 'public availability of data' is not so well. Oh, but wait a minute. Oh, I see... If you look at it a little bit longer, all sorts of questions come up. But now I think I understand. Hospital C is very reserved as to providing quality information. Oh dear, I find this very annoying. If I'd only had a fast glance, I wouldn't have understood.*

The naming of several quality indicators was poorly interpreted, such as 'reimbursement', 'restitution', 'test opinion', 'public availability of data', 'quality indicators', and 'clinical specialty'. For example,

> *I don't understand the term 'reimbursement'. Perhaps I can read somewhere what that means? 'Restitution', or 'mixed', or 'in kind'. Does 'reimbursement' mean that I get my medication directly?*

> *'Quality indicators' represent the extent to which they pay attention to the patient. That's interesting, of course. Because it indicates whether they find patients important. Well, not always, but more and more, though.*

In reality, the term 'reimbursement' refers to how insurance claims are processed: either directly, without interposition of the consumer, or indirectly via the consumer. 'Quality indicators' do in reality reflect objective performance indicators, and not merely patient-centeredness. Global ratings were often misinterpreted as well. Many participants thought that global ratings were composed of other presented indicators. In fact, global ratings are given by patients on a scale from zero to ten on a questionnaire item. In contrast, some terms were well understood, such as 'opinion of ex-patients', 'information', and 'telephone assistance'.

We further learned that many participants were comparing the presented information to their own experiences and ideas (theme 7):

> *Overall I think the score of health plan A is a bit low. My experience is that they are not that bad.*
>
> *But Hospital C is my first choice, although I live in place A. I just don't like the two hospitals near place A.*

We observed this tendency in interviewees' responses to the information content, but it appeared to be related to their hypothetical choices as well:

> *I don't want to go to hospital B because of an old-fashioned idea that I have. Because there were several incidents in my surrounding in that hospital. And that's why I'm not inclined to go to that hospital, as good as it may be now.*

This quote tells us that the interviewee would not choose for hospital B, because its performance conflicted with ideas already in mind.

A final aspect related to participants' reactions to information content was that the quality of the information itself was frequently questioned (theme 8):

> *The 'opinion of ex-patients'. Well, maybe only two patients were questioned? So I'd like to know more about this website. I'd like to know how the opinion of ex-patients, how that works. Was the sample large enough?*
>
> *When there are question marks, just like here, you can question the adequacy of the information.*

From these quotes, we see that questions were raised about the completeness and reliability of the information. In addition to these issues, interviewees also commented on the magnitude of quality differences.

Use of information

Participants' thoughts often focused on the potential use of the information in daily life (theme 9):

> *I'd never make a decision based on this kind of information. Perhaps rather on personal experiences of others, and I would ask others.*
>
> *I didn't know that this kind of information is available. So now that I know, I think it's interesting information. It's tempting to look at it at some time. So I think I would look at it.*
>
> *If I had to make a choice, I would look for things that I find important. But I think I know to which hospital I'd want to go. That's because I have experience with that hospital and I'm satisfied. If you are very satisfied with a particular hospital, and that hospital does not have so many stars, I'd rely on my own experience.*

These quotes illustrate the variation among consumers' interest to use the information in daily life. Some interviewees thought that comparing providers on different quality aspects is a tough and time consuming activity. Others felt that information could be a helpful tool for their healthcare decisions. One agreed that other information sources were required to make an informed choice, either instead of or complementary to comparative information. Frequently cited information sources were their own experiences and perceptions, experiences of relevant others, provider image, advice of family doctor and health insurer, and media reports. How the information could be used in daily life (theme 9) appeared to be associated with the design and content of the website, such as the amount of information, and with the perceived relevance of quality indicators.

Interviewees also differed concerning the decision strategies used to make a hypothetical decision during the choice task of the interview (theme 10):

> *Well, I find quality of care most important. Yes, the score of 'clinical specialty'. And then I'd choose for Hospital A. Because that hospital is the nearest. And because Hospital A still has a good reputation. That reputation is not contradicted on this website. But, apparently, 37% of the requested data were provided. I'm not immediately sad with a performance of three stars on 'clinical specialty'. And the 'opinion of patients'. I think that's important, but they do not highly differ from each other, I see. And besides, this score is all right for hospital A, a score of 7.7.*

> *If I have to choose now, on basis of these data, I would find it hard and complicated. Perhaps then I'd focus on, God help me, the global rating of 8.2.*
>
> *I concentrate on aspects where large differences exist. These are found on 'clinical specialty'. That's where differences exist. 'Opinion of family doctor' is not available. But especially this one with two stars. I think that's bad, compared to the others.*

Many of the strategies listed in Table 6.1 were used. Several participants systematically weighted the information. For example, they examined quality aspects one by one (WADD) or first defined most important aspects and then compared performance (LEX). Additionally, strategies by which providers were excluded one by one when performance did not meet requirements were often used (EBA). Frequently observed as well was the strategy to count up the number of good and bad scores on different aspects (FRQ). However, more simple associative strategies and shortcuts were also used. Some interviewees, for instance, chose the provider with the highest global rating (Performance Oriented). Yet, even more simple strategies, such as choosing the provider first named (In Store), providers with a familiar name (Affect Referral), providers chosen before (Habitual Heuristic), or the cheapest provider (Price Oriented), were used. Most participants adopted a mix of the above mentioned decision strategies, particularly those who systematically weighted information.

Many interviewees had difficulty making the hypothetical decision. First, several participants were not able to complete this task, because they needed additional information from other sources. Second, it took most consumers lots of time to complete the task. Third, several participants used shortcuts to decide, which indicates that the amount of information was too large for them to process systematically. Apart from these difficulties, we found incongruity between what consumers said to find important or what they would do, and what they actually did when making a choice. For example, during thinking aloud, several participants came up with aspects that they prioritized. Later on, however, these aspects were not weighted in their decisions.

Purpose of the information

Participants had clear ideas about the direct purpose of the information (theme 11). Although a few consumers thought that the information was designed to inform health insurance companies or hospitals themselves, most participants related the information to consumer choice in healthcare:

> *This information attempts to rate hip surgery quality. The aim is to get some insight into this quality. Then I can choose what's important to me. Should the clinician be excellent? Should the hospital be near? You get some information on these aspects.*
>
> *The intention is to provide a summary of all options, so we can make choices in healthcare and live happily ever after.*
>
> *If people want more freedom of choice in their health insurance, they obviously want to know what they can ensure, what is available, how fast and reliable such insurers are. That's what you are looking for when using this information.*

We see that consumers generally knew why the information is presented to them. However, this does not necessarily mean that they actually wanted to use it, for example, if there are few provider-differences.

Participants' thoughts also concentrated on the purpose of different quality indicators (theme 12). Most consumers were able to describe the purpose of different quality indicators, in particular when they saw benefits of presenting the information:

> *'Opinion of family doctor'. Family doctors do have an idea about how clinicians do their work. And these doctors give their view as well. They give stars, or they say they have no idea.*
>
> *The global rating for health plans is presented because people are used to think in numerals. Therefore, a rating from 0 to 10 immediately says something. If a health plan has a global rating of 5, everyone thinks "Oh no, that's not where you'd have your insurance". It's as simple as that.*

Discussion

We described how consumers process and evaluate comparative healthcare information published on the Internet. People applied various strategies to process the information they were provided with, especially when making hypothetical decisions. In line with the findings of Harris (2003), variation was shown concerning consumers' willingness to use the information. Nevertheless, we detected a main line from consumers' thoughts, classified into twelve themes. These themes were categorized under four important areas of interest:

1. A response to the design;
2. A response to the information content;

3 The use of information;
4. The purpose of the information.

Study strengths and limitations

Our study is the first to investigate in-depth consumers' own thoughts about Dutch comparative healthcare information. An important strength is that real online information was used, with all its complexities included. We used three different websites which are typical for websites internationally (Damman and Rademakers, 2008), and the results were of the same order for these three websites. The open qualitative approach resulted in detailed information about the interpretations and experiences of consumers themselves. Our findings therefore provide a thorough and valid understanding of consumers' experiences and the difficulties that they face. However, our small scale study does not allow for specific recommendations concerning presentation formats. More controlled experiments and observational studies are needed to further investigate decision making using online comparative healthcare information.

A limitation of our study is that neither low educated people nor ethnic minorities participated, although they were invited. This might suggest that certain consumer subgroups are not interested in comparative healthcare information, think that participating is too difficult, or that their jobs or lives are less flexible. Lower educated people are known to have more difficulty understanding healthcare quality information. In addition, the use of Internet is limited among lower educated people and ethnic minorities (Couper et al., 2007). This means that their use of the information might even be more complicated than was shown among our participants. Further research should be conducted to investigate these potential problems concerning accessibility of information and equity.

Our findings were also limited by the fact that our participants were not facing a real decision. We forced consumers to choose, which can bias the results towards the 'safer', more average option (Dhar and Simonson, 2003). Patients facing a real decision in healthcare might weigh other aspects than volunteers in hypothetical choices. Real healthcare consumers usually do not have a 'no choice' option either, though they can decide to leave the choice of a provider to their family doctor who refers them, or-in market research terms- who acts as a 'surrogate consumer' (Gabel, 2005). Is it important to realize that real decisions in healthcare involve many factors within a healthcare trajectory, rather than merely visiting one website to get informed (Pratt et al., 2006).

Important findings

A key finding is the tension between the great amount of information consumers stated to find important and how sporadically they actually incorporated this information into their decisions. Furthermore, ideas on which quality aspects are important to consider changed during the course of the interview. This inconsistency between (initial) interest in certain information and (later) leaving out of consideration has been found previously (Hibbard, Slovic, and Jewett, 1997; Eysenbach and Köhler, 2002; Adams, De Bont, and Berg, 2006). It suggests that preferences are constructed gradually during the interview (Slovic, 1995; Booske, Sainfort, and Hundt, 1999; Adams, De Bont, and Berg, 2006), and are not as predictable as is sometimes assumed. The prescriptive nature of our question (*what would you do...?)* might contribute to differences in what people said to what they actually did. Another explanation might be found in the data itself; when there are few provider-differences on aspects that one considers important, that aspect is not weighted in the eventual choice, though it is still considered important.

Considering the difficulties that participants experienced when processing the presented information and making a choice, we want to emphasize the perceived barrier of too much information. It is known that people can only process about six pieces of information at a time and are easily overwhelmed by information (Slovic, 1982). Therefore, providing all available information is not the most effective way to stimulate informed choices (Harris-Kojetin et al., 2001; Peters et al., 2007a). As argued by Eysenbach and colleagues (2002), websites do not always need to be complete and present the full information spectrum about a particular disease or healthcare topic. Indeed, consumers are able to gather information from various sources and sites (Eysenbach et al., 2002; Adams, De Bont, and Berg, 2006). Therefore, websites should rather provide conceivable overviews with small numbers of providers and the most relevant quality aspects, and offer more detailed information into step-by-step pages, an approach corresponding to humans' need for generic to specific information (Schank and Abelson, 1977; Vaiana and McGlynn, 2002). This deep-linking approach, which has been frequently cited in the broader context of consumer health informatics (Adams, De Bont, and Berg, 2006; Eysenbach, 2005), could reconcile consumers' desire for more information without overwhelming them. Gerteis and colleagues (2007) suggested using evaluative formats (for example stars) on a first page and let consumers drill down to more detailed bar graphs.

Consumers found it hard to process contradictory information, such as a hospital with high performance on one quality aspect, and low on another aspect, which also corresponds to previous findings (Hibbard and Peters, 2003). Conflicting information asks for more cognitive effort, which forces consumers to make trade-offs of important aspects and to rely on intuitive heuristics. Comparative healthcare information usually contains contradictory information. Initiatives to prepare or train consumers about potential contradictions might remove some confusion. However, effectively processing contradictory information requires relatively complex strategies and will continue to be difficult.

Only a few consumers deliberately processed all information. More often, only parts of the information were considered, particularly information about familiar providers. This suggests that consumers are not interested in all information, but rather want to check how particular providers perform compared to others. This corresponds to what we know from cognitive science about interpretation in light of questions and information already in mind when viewing information, such as reviews of other patients or media reports (Wright, 1987; Adams, De Bont, and Berg, 2006). Therefore, it seems important to relate comparative healthcare information to alternative information familiar to consumers (Harris-Kojetin et al., 2001). For example, anecdotal or patient review information (such as on *NHS Choices* in England (www.nhs.uk) and *Consument en de Zorg* in the Netherlands (www.consumentendezorg.nl) might be an interesting source of additional consumer information. Further research is needed to assess whether and how these different types of information should be integrated.

Various strategies were applied to choose providers, varying from systematic reasoning to more intuitive, experiential reasoning using only parts of information. Both alternative-based reasoning and attribute-based reasoning were used, which are both known to be used when information is presented in a matrix format (Paiton and Gentry, 1985; Jarvenpaa, 1989). In terms of web design, it means that pages presenting information need to be highly flexible, and preferably allow selections on both prioritized aspects and particular providers of interest.

A substantial number of the participants was interested in the presented information, and understood the purpose of the information. In line with a previous qualitative study (Trisolini and Isenberg, 2007), consumers appear to comprehend information among main lines, but have difficulty understanding more detailed information and concepts. Findings seem to contradict the notion of some researchers that consumers are not interested in comparative healthcare information. Perhaps the healthcare market is different from other markets where people prefer not to choose, e.g. the energy market (Giulietti, Price, and Waterson, 2005; Brennan, 2007), in the sense that healthcare is a product that is of interest to people. There are many documentaries and talk shows about health and healthcare, and hardly any about gas and electricity. So even if consumers are not willing to choose, they can still find healthcare information interesting.

Conclusions

Although it is not possible to generalize our findings or to create specific guidelines, some general conclusions can be made. We identified several barriers that consumers face when processing comparative healthcare information; in particular the information amount and the interpretation of detailed information. In addition, several interviewees could not let go of factors outside the task, and many struggled with the choice task. Many of the themes derived from the interviews and subsequent conclusions correspond to existing knowledge from cognitive science and Internet research. In other words, what is generally known about good website design and usability also applies to online comparative healthcare information. For example, clear overviews and flexible navigation options are important conditions for an effective use. Two topics that more specifically concern comparative healthcare information need further attention:

1. The presentation of comparative information in relation to alternative information from other sources. Access to anecdotal or patient review information could make the comparative information - being more factual and less animated - more relevant and easier to process. However, such initiatives are likely to increase the amount of information. In our opinion, only the quality themes that contribute to informed decisions should be presented. Future studies should test such minimum sets of comparative information in combination with alternative information;

2. The readability of the information in terms of specific quality themes and the overall concept of healthcare quality. Although numerous studies have recommended easy reading text, our study shows that concepts and text about comparative healthcare information are still not comprehensible. Any website presenting comparative healthcare information should test the specific naming of quality themes, preferably using cognitive interviewing techniques. In addition, we should use the experience of communication experts when it comes to communicating the quality of care concept.

In light of more general experiences of consumer choice stress, the results are relevant for future expectations of consumer choice in healthcare. Prospects about consumers' own active use of online comparative healthcare information as a stimulus for high quality healthcare may have to be tempered (Henwood et al., 2002; Adams and De Bont, 2007), at least until more effective presentation has been demonstrated. Given that comparative information will continue to be difficult, especially for consumers having low health literacy, public health policy could search for alternative pathways to get healthcare consumers informed about healthcare quality.

7

Discussion

This discussion is based on an article submitted as:
Damman OC, Hendriks M, Delnoij DMJ. Keuze-informatie op basis van patiëntenervaringen: aanbevelingen en dilemma's (Public reporting about patients' experiences: recommendations and dilemmas).

Over the last few years, health policy in several Western countries has aimed at making healthcare more transparent. Information about performance of different healthcare providers and health plans and about which costs are involved is increasingly being made public, for the most part on the Internet. One specific type of information being published is information about healthcare users' experiences and evaluations, also called *consumer assessment information*. In the Netherlands, this information is collected by a standardized instrument: the Consumer Quality Index (CQ-index or CQI).

Public CQI information seems to be suited to support healthcare users in making their decisions. It is known that healthcare users have a need for information based on other users' experiences (Fanjiang et al., 2007; Dafny and Dranove, 2008). Furthermore, CQI information contains themes that have been brought to the fore by healthcare users themselves (Rademakers et al., 2008). However, within the rapidly expanding movement of CQI survey development and publication of results, little research has been devoted to the question of how the information should be adjusted and presented on the Internet to function as public comparative information for healthcare user choice.

The aim of this thesis was to offer scientific evidence for adequate case-mix adjustment methods and effective presentation approaches of public CQI information. In the studies described in the previous chapters, the following research questions were addressed:

1. *"Which case-mix adjustment strategy should be applied to ensure fair comparisons between healthcare plans or providers?"*
2. *"How are different types of comparative healthcare information presented on the Internet?"*
3. *"Which presentation formats of comparative healthcare information support healthcare users?"*

In the first part of the thesis we looked at several case-mix adjustment methods. In the second part, presentation approaches were examined and tested. The studies resulted in recommendations important to different stakeholders working with the CQ-index and public comparative healthcare information. In the present chapter, we describe these recommendations and discuss several implications for stakeholders. The recommendations can be divided into two categories:

1. Recommendations concerning case-mix adjustment to ensure fair provider comparisons;
2. Recommendations concerning presentation formats to display the information on the Internet.

Main findings

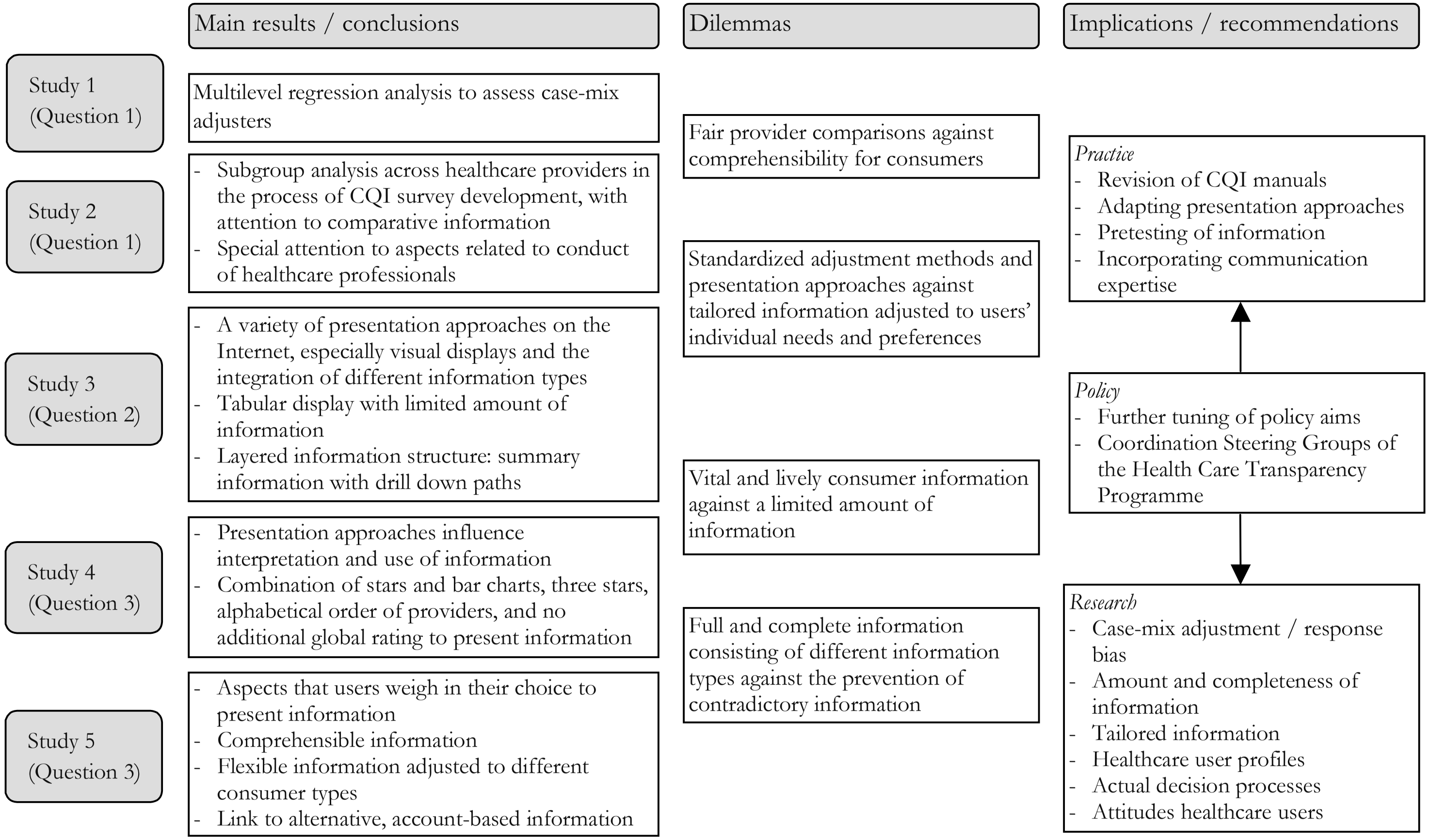
Figure 7.1 provides a schematic overview of the main findings of the studies described in this thesis, several dilemmas emerging from the studies, and recommendations for different stakeholders.

Case-mix adjustment

1. *"Which case-mix adjustment strategy should be applied to ensure fair comparisons between healthcare plans or providers?"*

In the early days of the CQ-index, case-mix adjustment was based on the method developed by CAHPS. This method does not take into account the hierarchical structure of CQI data (the clustering of healthcare users within the healthcare providers being monitored). This thesis showed that multilevel regression analyses -that do take the hierarchical data structure into account- are well suited to select person characteristics for case-mix adjustment. Important advantages of the multilevel method are that within-group clustering of experience observations is more properly handled, that it is a less labor intensive method, and that the effects of adjustment can me measured at the level that concerns comparative information, namely the level of the healthcare providers or health plans. Furthermore, multilevel random effects modeling seems a promising method to assess systematic differences in healthcare user subgroups' experiences across healthcare providers or health plans. If the influence of case-mix adjusters is not uniform, then different response patterns of healthcare user subgroups would be observed within different healthcare providers. For example, it could be that in Hospital A older people are more positive than younger patients and that in Hospital B younger people are more positive than older people. This could indicate that healthcare providers treat certain groups of patients differently. In this thesis, such systematic differences were particularly found on CQI outcomes about the conduct of healthcare professionals. Therefore, we concluded that in the process of CQI instrument development, response patterns for healthcare user subgroups should be investigated for each healthcare provider separately. Where necessary, stratified reports for healthcare user subgroups should be considered.

Figure 7.1 Overview of this thesis' results, dilemmas and recommendations for stakeholders



Presentation approaches

2. "How are different types of comparative healthcare information presented on the Internet?"

After proper case-mix adjustment of CQI data, thought must be given to the way in which the CQI data are presented on the Internet. We showed that comparative healthcare information is actually presented on the Internet in a multiplicity of ways. The same was true for information based on healthcare users' experiences. Concerning the visual display of the information, many different presentation approaches were found, both within the same website and between different websites. For example, words, numbers, and a variety of symbols (such as stars, triangles, thermometers, and traffic lights) were used. However, similarities between websites were found as well, such as a tabular layout with the healthcare providers presented in rows and aspects of choice in columns. In addition, websites often used an hierarchical information structure, which means that general information is first displayed in summary tables and more detailed information can be found by clicking on presented aspects (so called 'drill down paths'). It seems important to present a limited number of aspects in the summary tables, so that healthcare users can actually weigh up these aspects. If too much information is shown at one time, the chances are that users will consider only one aspect that stands out, whilst the other aspects may also be of importance to them.

3. "Which presentation formats of comparative healthcare information support healthcare users?"

The question remains which presentation approaches should be used for the display of CQI comparative information. In an experimental study, it was shown that a three stars system and displaying the healthcare providers in alphabetical order supported individuals in selecting the best performing provider. We also found that a combination of stars and bar graphs without the display of a global rating for the healthcare provider contributed to the correct interpretation of the information. It was concluded that presentation features influenced the comprehension and use of CQI information, and that the presentation approaches that supported individuals should be applied when publishing CQI comparative information.

The information that was presented in the experiment was much simpler than the comparative information that typically appears on the Internet. For this reason, we performed a qualitative study in which individuals were confronted with existing comparative healthcare information on three Dutch websites. The majority of the interviewees quickly determined what they thought was important and in this way selected parts of the information. We found contradictions in what people said and what they actually did. This was shown by various interviewees indicating that they thought certain aspects of choice to be important, while these were hardly considered when making their choices. In addition, interviewees frequently stated that they wanted to have more information, whereas the amount of information on the screen quickly became overwhelming. This indicates that people do not have fixed preferences when they view comparative information, but instead develop their preferences along the way. Most interviewees found the information difficult to understand and use. This appeared from the fact that various aspects of choice were interpreted incorrectly and that interviewees did not understand contradictory information. Furthermore, people had difficulties to disregard their own experiences, ideas, and information from other sources. A final important finding was that various decision strategies were applied when making a choice. Important conclusions are that: a) only those aspects should be presented that large groups of healthcare users actually weigh in their decisions (instead of all aspects that healthcare users say they find important); (b) the concept of quality of care and the associated quality indicators should be explained in a more comprehensible way; and (c) the layout of websites must be flexible in order to meet the needs of different healthcare user subgroups.

Dilemmas

A number of dilemmas emerged from the study results (see Figure 7.1). The first dilemma is the importance of a fair comparison between healthcare providers but also the desire to be able to explain to the public how the information was collected, analyzed, and case-mix adjusted. The multilevel method is well suited to analyze consumer assessment data but is not a widely applied method. The analyses by which response patterns of healthcare user subgroups are examined for each healthcare provider are relatively simple to include in the existing way of working. However, when creating stratified reports, a variety of complex data collection methods and processes are involved. Previous research (Robinson and Brodie, 1997; Tange et al., 2008) has shown that the public wants to know whether comparative information is accurate and reliable. Healthcare users can only determine whether this is the case when they understand the used methods. An important question is whether and how case-mix adjustment methods can be clearly explained to the public. Especially since there are limits to the amount of explanations that can be given to users.

Another dilemma is the desire to standardize case-mix adjustment methods and presentation approaches against the desire to provide tailored information. At this moment, various presentation formats are used, and due to this, people may not understand quality differences (Rosenstein, 2004). It is possible that healthcare users need to gradually get used to comparative healthcare information and this may be stimulated by using uniform presentation formats. From previous research about information processing (Fogg, 2003) it is however known that individuals have more interest in information which is linked to their own needs and preferences. In our qualitative study the importance of various types of search and decision strategies was also apparent. From this viewpoint, one could argue for tailored information; access to advanced decision options and selection menus tailored to users' own preferences.

Concerning tailored information, it is important to differentiate between different types of users, such as maximizers and satisficers (Schwarz, 2004). Satisficers search until they find something that meets their needs and then stop. Maximizers carry on searching and want to find the very best. They are more inclined to delve into information and continue by clicking on more detailed information. Satisficers will probably be frightened off at an earlier stage by the sheer quantity of information and will prefer summary tables. The contra-intuitive result that an alphabetical order of healthcare providers supported healthcare users in choosing the best performing provider can be placed within this reasoning. It could be that some individuals are not looking for the best healthcare provider, but rather want to be able to find their own provider easily in summary information, in order to determine whether this provider meets minimum requirements. The different healthcare user types distinguished by Groenewoud (2008) are pertinent in this respect. His research revealed that there are patients who focus on trust in healthcare and patients who focus on outcomes of the healthcare provided when choosing a healthcare provider. If all healthcare user groups are to be provided with relevant comparative information, then different types of information may need to be presented.

A third dilemma is the desire to present more lively information against the need to offer a succinct overview. From previous research we know that people appreciate anecdotal information more than data based on empirical research (Robinson and Brodie, 1997; Mennemeyer, Morrisey, and Howard, 1997). Accordingly, 'dry bones' of information should perhaps be presented in such a way that it matches more with the real experiences of healthcare users. For example, presenting images, pictures, and anecdotal stories of patients alongside the tables, charts, and figures. The fact that interviewees had difficulty to disregard information from other sources in our qualitative study supports the argument for linking 'objective' comparative information with more account-based information. A consequence of this approach might, however, be that the quantity of information increases while, as has been repeatedly shown in the literature and in our studies, an overabundance of information is one of the main barriers for proper information utilization (Hibbard, Slovic, and Jewett, 1997; Veroff et al., 1998; Hibbard, 2008).

A final dilemma is on the one hand wanting to present different information types (information from the healthcare providers themselves, CQI information, information concerning terms and conditions of healthcare; Van Loon and Tolboom, 2005; Bokhour et al., 2009) and on the other hand not wanting to provide any contradictory information. This thesis showed that healthcare users had difficulty dealing with contradictory information such as a healthcare provider having a high global rating while performing poorly in the conduct of healthcare professionals. Another example is when hospitals' own records indicate acceptable waiting times for treatment whereas healthcare users report negative experiences with these waiting times in a CQI questionnaire. The greater the variety of information types presented, the greater the chance of contradictions appearing. For healthcare users, these kinds of contradictions bring about confusion and perhaps a lack of trust in the information.

Implications

The findings of this thesis and the described dilemmas are important for three key actors in the Netherlands:

1. *Policy.* These are the Ministry of Health, Welfare and Sport (VWS) and the steering groups of the Health Care Transparency Programme (Zichtbare Zorg);
2. *Those involved in practice.* More specifically, we mean the Dutch Centre for Consumer Experience in Health Care (CKZ) who draws up the guidelines for CQI assessments, and the managers of websites presenting comparative healthcare information. These parties are the key channels through which CQI information reaches important stakeholders, such as hospitals and health insurance companies, and of course the healthcare users;
3. *Researchers.* These are the CQI researchers and researchers examining informed decision making in healthcare.

Policy

For the implementation of our recommendations, attention should be paid to the policy aims of public comparative information. The following viewpoints are especially important in the context of policy aims (Delnoij, 2009):

1. Transparency is a right of healthcare users. Healthcare users need to be informed about the quality of care that is provided by healthcare providers in order to emancipate themselves (patient empowerment);
2. Transparency is required to ensure public accountability; healthcare institutions should provide insight into how they utilize collective resources and what results they achieve with these resources;
3. Transparency provides healthcare providers with a stimulus to improve quality of care. The fact that providers appear on the Internet with a score next to their name is in itself a motivation to initiate improvement projects within the organization;
4. Transparency is a (pre)condition for the success of regulated competition in healthcare. Healthcare users' decisions based on public information encourages healthcare providers and healthcare insurers to compete in terms of quality and price.

Within the Dutch Healthcare Market Regulation Act (WMG), it is stated that healthcare providers have to inform the public about price, quality and other aspects of healthcare in order to stimulate regulated competition. Currently, the steering groups within the Health Care Transparency Programme are responsible for bringing about transparency in the various healthcare sectors. Each healthcare sector has its own steering group consisting of healthcare insurers, healthcare providers, patient organizations and the Healthcare Inspectorate (IGZ). Although all steering groups aim for transparency (developing indicators and publishing the results), the emphasis placed on CQI comparative information is different in each steering group. In the nursing homes and homecare sector, the steering group is heavily involved in the decisions concerning adjustment and presentation of CQI data. In other sectors, for example physiotherapy and mental healthcare, the steering groups are more removed from the exact processes. The actual decisions made about presentation approaches also vary between the steering groups. Given the importance to standardize case-mix adjustment methods and presentation approaches, a more central coordination over the steering groups is desired. Policy makers at VWS and the Health Care Transparency Programme should consider whether and how different types of comparative information can be presented in a more standardized manner.

If comparative information is primarily generated and published to contribute to regulated competition in healthcare, then the presentation format should perhaps be more suited for 'maximizers' , a minority of the public who wishes to be fully informed and to make active decisions. The (small) market shifts caused by the decisions of maximizers might provide sufficient stimulus for regulated competition. Healthcare users who do not consider the full scope of information and therefore make less informed decisions can possibly benefit from the quality improvement initiated by these market shifts. For maximizers, it seems important to offer comprehensive information, including explanations of data collection and case-mix adjustment methods. An important point to bear in mind is that if the maximizers are mainly young, well educated critical individuals, healthcare will be chiefly tailored to this group due to competition considerations. It remains the question whether healthcare will also automatically improve for older, less well educated, more 'accommodating' individuals (Grit, Van de Bovenkamp, and Bal, 2008).

From the 'patient empowerment' viewpoint, it is important that comparative information is complete, easy to access, and tailored to individual needs. The aspects presented should be those that healthcare users (want to) use in their decisions. The information does not by definition need to result in choices for the best performing providers. This means that displaying the best performing provider in a prominent way is less important. Instead, the information could be arranged in a manner by which users can quickly find their trusted provider and evaluate its performance. Another important factor is the comprehensibility of the information: information that is too complex will not facilitate healthcare users to emancipate or to have more equal relationships with healthcare professionals. Therefore, policy makers should become aware of the complexities involved in comparative healthcare information, and of the fact that making large amounts of data available will not automatically lead to patient empowerment. In contrast, it is more likely that healthcare users become distressed by the complexity of the information.

If we look at comparative information in terms of stimulating providers to start quality improvement projects (Berwick, James, and Coye, 2003; Hibbard, 2008), it is also less important that the information is decision-supporting. Instead, it is essential that different relevant aspects of quality from the perspective of healthcare users are represented. In this way, quality improvements will concern those aspects that healthcare users find important. In line with this, Hibbard (2008) advocates information to be presented in such as way that the public can quickly arrive at a judgment as to who is the best and worst.

If the aim of public comparative information is mainly for public accountability, it seems that it suffices to provide the public with an insight into a limited set of relatively global indicators. This would imply information showing that healthcare users were generally satisfied with the healthcare provided, and exhaustive information would not be necessary. Concerning information from consumer assessments, global ratings from the surveys are well suited to public accountability.

In conclusion, we can state that, depending of the policy aims, case-mix adjustment methods and presentation approaches of (CQI) comparative information need further consideration.

Practice

In 2008, the CKZ published CQI manuals for the further standardization of instrument development and measurement processes (Sixma and Delnoij, 2008). The manuals contain protocols for data collection, analysis, and reporting of CQI research. The results of our study about appropriate case-mix adjustment methods (Chapter 2) led to changes in the manuals. Multilevel modeling is compulsory and the CAHPS method is no longer allowed. Furthermore, we recommend including a section in the manuals on investigating the influence of respondent characteristics across healthcare providers. If variable response patterns across healthcare providers are found, these results should be discussed by the key stakeholders involved in the instrument development, and alternatives to the traditional case-mix adjustment should be considered. For example, performance information can be stratified for different healthcare user subgroups using multilevel regression with random effects for the respondent characteristics. Another possibility is to consider a completely different method for correcting for systematic differences in reporting behavior. King et al. (2003) and Rice, Robone, and Smith (2009) describe a method using anchoring vignettes to identify reporting tendencies. These anchoring vignettes describe hypothetical situations, for example a situation of information provision by the healthcare provider. The idea is that the vignettes are fixed and predetermined and that any systematic variation across respondents in the rating of the vignettes can thus be attributed to differences in reporting behavior (and not to real differences in treatment). Healthcare users' experiences can be analyzed using regression models with corrections for users' responses to vignettes.

The manuals for CQI measurements also stipulate how public comparative information should be presented to healthcare users. One of the guidelines is that the healthcare providers are displayed from best provider to worst provider. Given the findings in this thesis, this guideline should be amended. We would recommend that the providers are shown in alphabetic order. The other CQI guidelines are in line with our recommendations.

Today, several websites in the Netherlands provide the public with comparative healthcare information. In view of recent developments in the United States, it is likely that the number of Dutch websites will further increase. Therefore, it is important that the various existing websites take note of the results of this thesis. The specific recommendations concerning presentation approaches can be adopted by website managers. To be able to cope with the large amount of available information, a layered approach could be adopted: summary information first and more detailed information accessible by clicking on an icon or by means of extended help menus. Maximizers will be able to find more information and satisficers will not be overwhelmed by detailed information.

The results of our qualitative study lead to advocating more intensive pre-testing among healthcare users before comparative information is released on the Internet. Websites usually test their information through usability tests, but this thesis showed that the usability of the information also depends on how understandable the language is and on the explanations provided. As long as healthcare users do not understand what quality aspects mean and what the stars represent, it is unlikely that the information will be utilized (Hibbard, 2008). By first performing cognitive interviews (Beatty and Willis, 2007) with healthcare users, better explanations of terminology and symbols on websites can be developed. However, it is unclear who is responsible for the content of the texts on comparison websites. Would this be the website managers, or perhaps the research staff who provided the data? In many cases, website managers and/or research staff will not be communication experts, though it is precisely their expertise that is needed.

Managers of comparison websites should give more thought to whether and how standardization of presentation approaches is feasible. The basis for more standardization could be the effective presentation approaches found in our studies. However, websites are usually private initiatives. The organizers and managers want to distinguish from the crowd, and it may thus be difficult to persuade them to adopt standardized presentation formats. Patient associations could play a part in stimulating standardization, for example by recommending well designed websites to their members.

An additional issue important for website managers is the fact that public reports often contain contradictory information. This thesis showed that contradictory information leads to confusion. The fact that public reports typically include different information types aggravates this problem. A number of websites try to deal with different information types by either integrating them or explicitly separating them. Different potential solutions were touched upon in the different chapters of this thesis. However, these recommended procedures, such as incorporating communication experts' knowledge into website design, do not fully solve the problem since users would still have to be very motivated and conscientious information processors to evaluate all provided visual cues and text. Therefore, we would advocate a growing awareness of the conflicting information healthcare users are provided with. When the same quality of care aspects are measured in different ways and from different perspectives, it is the question whether these aspects should all be represented in public reports. Clearly, different types of information can be useful to inform policy and healthcare providers themselves. However, in order to support healthcare user choice, it seems important to assess a limited set of indicators which are actually decision-supporting.

It will be a challenge to systematically identify the most important aspects of choice for healthcare users. User preferences have been demonstrated to be instable, and again, the question of healthcare user diversity will emerge. In addition to a growing awareness from researchers and websites, patient and consumer associations can play a more prominent role in the disclosure of more brief and straightforward information. These organizations could make use of a customer panel to develop a consumer-oriented 'best buy' of healthcare providers. In this way, a selected group of individuals intensively evaluates comparative healthcare information and acts as agent for individual healthcare users. As a result, it would not be necessary for each individual healthcare user to assess and process comparative healthcare information.

Research

In addition to the conclusions described in the separate chapters and the recommendations and dilemmas outlined in the current chapter, a number of overarching themes have emerged from this thesis that need further research.

First, more systematic research is needed on response biases in healthcare experience surveys. As recently argued by Elliott and colleagues (2009), it is often difficult to distinguish differences in response tendency from real differences in experiences. Are older people inclined to report more positively or are they treated better than younger people? In this respect, adequate methods such as random slope analyses are useful to more fully examine healthcare user subgroup experiences with each healthcare provider. Since it is the effective choice of healthcare users that is a central aim of healthcare transparency, decisions about case-mix adjustment should depend on the potential added value of stratified reports for healthcare users. However, within current practices, creating stratified reports is not always possible because of low numbers of observations per healthcare provider and/or per user subgroup. Not all user subgroups are equally well represented in the samples. In our opinion, the methodological benefits and practical implementation of a method using anchoring vignettes and a method using random slopes should be compared.

However, it should be borne in mind that what healthcare users find useful presentation formats are not always accurate approaches from a methodological perspective (Leckie and Goldstein, 2009). We would not recommend stratified reports for young and old healthcare users when there are few young or few old people in the sample. Another example is the use of absolute ratings (in contrast to relative ratings). Absolute ratings (e.g. all providers having a rating of 3.5 or higher on a scale from 1-4 receive 3 stars) may seem easy to interpret. However, the differences between healthcare providers' ratings are not necessarily statistically significant when absolute ratings are used. This can lead to misleading conclusions concerning quality differences between providers.

A second suggestion for future research is to determine the amount of information that healthcare users can be provided with. Although the large amount of information has been repeatedly mentioned in the literature (McCormack et al., 1996; Harris-Kojetin et al., 2001) as barrier for an effective use of information (also in studies about other kinds of information), it is unknown what amount of information healthcare users are able to manage effectively. We would propose that this topic needs attention in the Dutch situation, since the current emphasis on transparency is bringing about a vast amount of different types of comparative healthcare information. Healthcare policymakers and patient associations are inclined to make all information public on the Internet, without paying attention to healthcare users' abilities to deal with the information. Healthcare professionals' associations are more reserved to the disclosure of large quantities of comparative healthcare information. However, their primary objections stem from the perspective of healthcare providers, and not from the perspective of healthcare users. Our findings that users get easily overwhelmed by the information and have difficulties to understand apparently simple information suggest that researchers should look for the amounts of information that healthcare users are able to manage.

Related to assumptions about individual responsibility underlying healthcare reforms, more research is needed on how healthcare users make their decisions. This thesis showed that healthcare users do not have stable preferences concerning quality aspects of importance and do not automatically choose for best performing providers. This confirms existing knowledge from psychological decision theory about people being unable to make choices in their best interests (Hsee and Hastie, 2006; Thaler and Sunstein, 2008). Future studies should systematically analyze the decision strategies adopted by healthcare users and the systematic biases that come into play. Do healthcare users choose sub optimally because they can not accurately predict which alternative yields the best results? Or because they do make accurate predictions, but fail to base their choice on these predictions? In order to design comparative information more effectively, we need to get more insight into these exact mechanisms.

It is largely unclear how healthcare users can be differentiated among profiles, and how users belonging to these different profiles deal with comparative healthcare information. Chapter 6 showed that even among a small sample of healthcare users, a number of different information preferences as well as different decision strategies were identified. Although we did not systematically analyze the differences between the healthcare users interviewed, it appeared that user preferences and strategies depend on person characteristics. Clearly, more research is needed to assess whether presentation of information should be more adjusted to healthcare user profiles. An interesting classification concerning the presentation of information is that between healthcare users who focus on healthcare outcomes and healthcare users who focus on trusting healthcare professionals (Groenewoud, 2008). Harris-Kojetin and colleagues (2001) proposed to distinguish between individuals who are interested in technical aspects of data collection, survey, and sampling methods and individuals who are not. Another categorization is that between maximizers and satisficers. From the perspective of regulated competition in healthcare, it would be of interest to know which types of healthcare users show high levels of 'patient activation', that is, a high willingness to actively participate in healthcare decisions.

Besides the precise information processing and decision strategies that are used by different subgroups of healthcare users viewing comparative information, it is important to examine healthcare users' attitudes towards informed decision making in healthcare. For example, the questions whether (future) healthcare users want a more active role and will view healthcare more in market terms are relevant to answer. It has been argued that healthcare is - at least for a great part

- a question of trust, because healthcare users can not judge the quality or effectiveness of particular medical treatments (Grit, Van de Bovenkamp, and Bal, 2008; Delnoij, 2009). Moreover, choices in healthcare may be more complex or less interesting to individuals compared to other consumer markets. We would recommend that more research is conducted about healthcare users' own attitudes towards healthcare as 'market product' and that potential changes in these attitudes will be monitored over time.

It is also unknown to what extent healthcare users will be actually empowered by the publication of comparative healthcare information. As argued in this thesis, patient empowerment is often cited as one of the purposes of comparative healthcare information. However, there is very limited knowledge about how healthcare users are experiencing this emancipation process. The nature of Internet information (which will probably continue to be extensive and difficult) might impede a radical change of the medical encounter. Healthcare users will probably be only partly influenced, and deal with information in their own ways, as was shown in Chapter 6 (see also Hardey, 2001; Adams, De Bont, and Berg, 2006). In addition, it remains the question who will actually benefit from the use of comparative healthcare information. Can we speak of 'patient empowerment' when only particular healthcare user subgroups are taking advantage of the information? And more importantly, is the utilization of comparative healthcare information resulting in proportionate demands on healthcare resources, without the detriment of under-served groups?

In addition to more research on healthcare users' attitudes and behavior, which relate to the selection pathway described in Chapter 1, future studies should also concentrate on the exact mechanisms of change pathways. It is still unknown how healthcare professionals experience and react on the disclosure of comparative healthcare information. Mihill (2000; in Hardey, 2001) states that *"Presumably GP's will have to become more guides and translators of a mass of unfiltered information to help patients gain accurate knowledge about their condition".* Reporting systems of comparative healthcare information for healthcare providers and professionals have hardly been studied, while it is generally expected that providers will react on reports of comparative healthcare information. Furthermore, reporting systems for health insurance companies have not received much attention. In order to understand the relation between the three markets and the eventual effects of selection and change on quality of care, reporting systems for all the parties in the system should be more comprehensively investigated.

Conclusion

This thesis resulted in a variety of recommendations to further optimize public comparative information based on the Consumer Quality Index. Concerning case-mix adjustment, it is important to assess case-mix variables with multilevel regression analyses. With regard to decision-supporting presentation approaches, a variety of effective methods were demonstrated, such as the three stars system and an alphabetical order of healthcare providers. At the same time, a number of dilemmas were highlighted in the current chapter. Future research is needed to solve these dilemmas. Differentiating between healthcare user profiles and their actual decision behavior are important themes for future studies. In addition, it is also necessary to initiate the debate between policy makers and website managers about the aims of public comparative healthcare information. The Ministry of Health, Welfare and Sports relates the publication of comparative healthcare information to a number of policy aims. The question remains whether the different policy aims can be all fulfilled at the same time with the same information adjustment and presentation formats.

8

Summary

The disclosure of comparative healthcare information in itself will not suffice to engage healthcare users in active, well-informed decision making. Previous studies in the United States have shown that most individuals do not use comparative healthcare information to make healthcare choices, but rather turn to friends, family and physicians for advice (Fung et al., 2008; Tu and Lauer, 2008). In addition, healthcare providers and other stakeholders have largely expressed concerns for valid data and thorough case-mix adjustment methods (Tu and Lauer, 2009).

Drawing on the perspective that comparative information based on *consumer assessment data* is needed for a successful demand-driven healthcare system based on regulated competition, this thesis investigated two key elements or conditions with regard to a successful *consumer assessment reporting system*. More specifically, the test case of the Dutch Consumer Quality Index (CQ-index or CQI) instrument was used to examine adequate case-mix adjustment and effective presentation. This instrument is the Dutch standard to measure healthcare quality from the perspective of healthcare users. The CQ-index is not a static instrument, but instead, changes as new methodologies and procedures have proven to be effective. Since its establishment in 2005, there has been a development towards further improvement, and particularly the publication of comparative information for user choice has received attention. The central issues in this thesis were the first studies on case-mix adjustment and effective presentation of CQI information, and therefore, the first to offer scientific foundation for a public reporting system based on the CQ-index.

Research questions

At the start of the studies in 2006, little was known about appropriate statistical adjustment methods or effective presentation approaches. Although the American studies of Zaslavsky and colleagues (Zaslavsky et al., 2001; O'Malley et al., 2005; case-mix adjustment) and Hibbard and colleagues (Hibbard et al., 2001a; Hibbard et al., 2002a; effective presentation) had resulted in important suggestions and guidelines, several questions remained. Some questions were specifically related to the Dutch situation, such as the question whether the presentation approaches recommended by Hibbard and colleagues would be equally effective for the presentation of Dutch CQI information. Other questions were related to broader gaps in the literature, for example whether hierarchical regression modeling would be useful to create an adequate case-mix adjustment method for consumer assessment data.

More specifically, the following research questions were addressed in this thesis:

1. *"Which case-mix adjustment strategy should be applied to ensure fair comparisons between healthcare plans or providers?"*
2. *"How are different types of comparative healthcare information presented on the Internet?"*
3. *"Which presentation formats of comparative healthcare information support healthcare users?"*

Case-mix adjustment

The first part of this thesis considered methodological approaches to adjust CQI information for the influence of case-mix of provider populations. Such a case-mix adjustment strategy is required to ensure fair and equitable comparisons between healthcare providers or health plans. In Chapter 2, we investigated whether multilevel analysis is a useful tool to select case-mix adjusters in consumer assessments of healthcare. The multilevel regression methodology was compared to the previously used (non hierarchical) 'impact factor' approach, which combines the predictive effect of each case-mix variable with its heterogeneity across providers. We used data about healthcare users' experiences with their health plan, collected with the CQI health plan instrument. Using the 2005 assessment with this instrument, we analyzed the experiences of 11,539 individuals nested within 27 health plans. The influence of respondents' age, self-rated health status, education, sex, ethnicity, and urbanization of area of residence on four outcome measures of the instrument was assessed. Furthermore, we examined the influence of these candidate case-mix adjusters on comparative information for healthcare users.

In Chapter 3, we investigated the influence of case-mix adjusters on healthcare users' experiences across different healthcare providers. By adjusting for relevant case-mix adjusters, consumer assessment information reflects average performances for average healthcare users. Information about how providers perform according to specific user subgroups is disguised, while this information could be interesting for healthcare users and other stakeholders. Multilevel random slope analyses were conducted using data of the 2007 assessment with the CQI Family Practice instrument. We assessed the influence of respondents' age, education, sex, self-rated health status, self-rated mental health status, and ethnicity on five outcome measures of the instrument, and examined the between practice variability of these effects. The reported experiences of 5,473 individuals within 32 family practices were analyzed.

The two studies on case-mix adjustment methods (Chapters 2 and 3) showed that multilevel regression modeling is a useful method to assess case-mix adjusters of CQI data. Multilevel modeling should be preferred over the previous used impact factor approach, since it provides several theoretical and practical benefits. For example, the within-group clustering of healthcare user experience observations is more properly handled and it is a less labor intensive method. Furthermore, multilevel random effects modeling seems a promising method to assess systematic differences in user subgroup experiences across providers or plans. In particular when CQI outcomes relate to the conduct of healthcare professionals, it is important to check for these systematic differences and to consider stratified public reports for healthcare users.

Presentation approaches

The second part of this thesis focused on presentation approaches of comparative healthcare information. Chapter 4 described a study in which presentation formats used on websites worldwide were outlined. In particular, it was compared how different information types (such as clinical performance indicators and healthcare user experience data) were presented, and which information displays and drill down paths were used. Additionally, a short survey was disseminated among the websites to assess how the presentation formats were selected. The review revealed that a wide variety of presentation approaches were used. It was concluded that more systematic selection or standardization of presentation formats is needed.

In Chapter 5, an experimental study was described in which the effects of specific CQI presentation approaches were examined on respondents' correct interpretation and effective use of the information. We used the conjoint analysis methodology to test the effects of the following five presentation features:

1. A combination of bar charts and star ratings versus only star ratings;
2. An alphabetical ordering of providers versus a rank ordering of providers;
3. Stars based on absolute performance versus stars based on relative performance;
4. Three stars versus five stars;
5. Inclusion of a global rating of healthcare providers or not.

Fictitious CQI data about the performance of home care providers were used to construct experimental presentation formats. We conducted multilevel logistic regression analyses with responses to the experimental formats (N=1,754) nested within respondents (N=438).

Besides selecting specific presentation approaches, insight into the perceptions and interpretations of healthcare users themselves is needed to adjust information to human information processing strategies. In Chapter 6, three existing websites providing comparative healthcare information were tested:

1. www.kiesBeter.nl;
2. www.independer.nl;
3. www.consumentenbond.nl.

These websites presented CQI information as well as other information types. Using cognitive interviewing techniques focused on thinking aloud and answers to probes, individuals (N=20) were questioned about their own evaluations and thought processes. We performed descriptive thematic analyses of the data - consisting of open and axial coding - and we described the most important topics that derived from interviewees' meaning making of the information.

In Chapters 5 and 6, we showed that the presentation of comparative healthcare information can be improved. More specifically, the following presentation approaches were recommended: a combination of bar charts and star ratings, a three stars methodology, no inclusion of a global rating, brief summary information, and deep linking through drill down paths. Another important conclusion was that different processing and decision strategies are applied by healthcare users viewing comparative information, both across different individuals and across different experimental instructions.

Particular issues that websites and future research should pay attention to are:

1. The integration of differet information types and the amount of information;
2. The linking of comparative information to alternative - more account based - information;
3. Adding evaluative meaning to information in stead of just putting numbers on the web;
4. The readability and comprehension of both specific quality indicators and the general concept of healthcare quality.

Policy and practice implications

In the discussion of this thesis, we concentrated on the question of how the most important recommendations resulting from the studies can be implemented (Chapter 7). Therefore, we first summarized the main findings of the studies described in this thesis and explored several resulting dilemmas in depth. Subsequently, the dilemmas for policy, practice, and research were related to the policy aims behind the public disclosure of comparative healthcare information.

Reflecting on the most important findings from the five studies, Chapter 7 suggested that attention is needed for the following dilemmas:

1. The desire to have fair comparisons between healthcare providers against the need to be clear to the public about case-mix adjustment methods;
2. The call for standardization against the desire to have information more tailored to healthcare users' individual needs;
3. The desire to make information more vital and lively against the need to provide succinct overviews;
4. A tendency towards presenting different information types against the desire to prevent contradictory, conflicting information.

To be able to solve these dilemmas, more research is needed, as well as discussions among policy makers, website managers, and researchers.

General conclusions

This thesis showed that multilevel regression modeling is a useful technique that should be the standard for assessing case-mix adjusters of consumer assessment data. In addition, multilevel random slope analysis provides the opportunity to more fully investigate the influence of case-mix adjusters across providers. This is important in the light of discussions about systematic response bias and systematic differences in quality of care, and the usefulness of information for subgroups of healthcare users. This thesis further illustrated that healthcare users are currently provided with large amounts of complex information. Nevertheless, several particular presentation approaches were shown to be effective in supporting healthcare users. Briefly, scientific evidence for the adequacy of analytical approaches and the effectiveness of presentation formats was developed by the use of diverse research methods. This evidence is highly needed to further establish effective public reporting systems based on consumer assessment data.

The implementation of the demonstrated effective methods needs careful consideration. Many parties working with the CQ-index in the Netherlands can benefit from the recommendations provided in this thesis. For example, the scientific committees of the Dutch Centre for Consumer Experience in Health Care (CKZ) can require or recommend particular methods or approaches to researchers and market research institutes working with CQI instruments. In addition, managers of websites can take advantage of the proposed effective presentation approaches to present their information to the public. However, as argued in Chapter 7, it is important to consider our conclusions in the context of transparent policy aims. As recently stated in a commentary article by Ginsburg and Kemper (2009), the policy aim of *"turning passive patients into active consumers"* is a slightly elusive goal. For the sake of patient empowerment, other requirements seem to be needed than for successful market forces in healthcare. Considering the regulated competition perspective that was the point of departure for our studies, we should continue to search for well thought-out analytic approaches, design and implementation. In addition to public reporting to healthcare users, reporting systems for healthcare managers and professionals and health insurance companies should receive more attention. In this way, we get more comprehensive insight into the conditions and effectiveness of selection and change mechanisms within the healthcare system.

Samenvatting

(Summary in Dutch)

De openbaarmaking van keuze-informatie in de zorg zal op zichzelf niet volstaan om zorggebruikers aan te sporen tot meer actieve, goed geïnformeerde besluitvorming. Eerdere studies in de Verenigde Staten lieten zien dat de meeste mensen geen gebruik maken van keuze-informatie bij het maken van hun keuzes in de zorg, en zich eerder wenden tot vrienden, familie en artsen (Fung et al., 2008; Tu en Lauer, 2008). Daarnaast hebben zorgaanbieders en andere belanghebbenden in grote mate hun bezorgdheid geuit als het gaat om de validiteit van de gegevens en gedegen case-mix correctie methoden (Tu en Lauer, 2009) van keuze-informatie.

Voortbouwend op de gedachte dat keuze-informatie op basis van *beoordelingen van zorggebruikers zelf* nodig is voor een succesvol vraaggericht zorgstelsel gebaseerd op gereguleerde marktwerking, werden in dit proefschrift twee belangrijke elementen van succesvolle publieke rapportage onderzocht. De testcase van de Nederlandse Consumer Quality Index (CQ-index of CQI) werd gebruikt om adequate methoden voor case-mix correctie en effectieve presentatiewijzen te onderzoeken. De CQ-index is de Nederlandse standaard om kwaliteit van zorg vanuit het perspectief van zorggebruikers te meten. Het is geen statisch instrument, maar verandert voortdurend met de ontwikkeling van effectieve methoden en procedures. Sinds de oprichting in 2005 heeft een ontwikkeling naar verdere verbetering plaatsgevonden, en vooral de publicatie van keuze-informatie heeft de nodige aandacht gekregen. De centrale thema's in dit proefschrift zijn de eerste studies die werden uitgevoerd naar case-mix correctie en effectieve presentatiewijzen van CQI informatie. De beschreven studies vormen daarmee de eerste wetenschappelijke basis voor een publieke rapportage van CQI keuze-informatie.

Onderzoeksvragen

Toen de studies in 2006 startten, was er nog weinig bekend over geschikte statistische methoden om te corrigeren voor case-mix invloeden, noch over effectieve presentatiewijzen. Hoewel de Amerikaanse studies van Zaslavsky en collega's (Zaslavsky et al., 2001; O'Malley et al., 2005; case-mix adjustment) en Hibbard en collega's (Hibbard et al., 2001a; Hibbard et al., 2002a; effectieve presentatiewijzen) belangrijke suggesties en richtlijnen naar voren hadden gebracht, bleef een aantal vragen onbeantwoord. Sommige vragen hadden betrekking op de specifieke Nederlandse situatie, zoals de vraag of de door Hibbard aanbevolen presentatiewijzen ook effectief zouden zijn voor het presenteren van CQI informatie. Andere vragen kwamen voort uit bredere lacunes in de literatuur. Een belangrijke vraag was of multilevel regressiemodellen bruikbaar zouden zijn voor het bepalen van case-mix correctievariabelen bij data gebaseerd op gebruikerservaringen- en oordelen.

De volgende onderzoeksvragen stonden centraal in dit proefschrift:

1. *"Welke case-mix correctie strategie moet gebruikt worden om eerlijke vergelijkingen tussen zorgaanbieders of zorgverzekeraars te garanderen?"*

2. *"Hoe worden verschillende soorten keuze-informatie op internet gepresenteerd?"*

3. *"Welke presentatiewijzen van keuze-informatie ondersteunen zorggebruikers?"*

Case-mix correctie

In het eerste deel van dit proefschrift werden methodologische strategieën onderzocht om CQI informatie te corrigeren voor de invloed van case-mix (verdeling van patiëntensubgroepen bij zorgaanbieders of zorgverzekeraars). Case-mix correctie is nodig om te zorgen voor eerlijke vergelijkingen tussen de aanbieders. In hoofdstuk 2 onderzochten we of multilevel regressieanalyses een bruikbare methode zijn om case-mix correctievariabelen te selecteren voor keuze-informatie gebaseerd op de ervaringen van zorggebruikers. De multilevel methode werd vergeleken met de eerder gebruikte (niet hiërarchische) 'impact factor' methode. Bij die methode wordt het voorspellend vermogen van iedere case-mix variabele gecombineerd met de heterogeniteit van de variabele onder de aanbieders. Er werd gebruik gemaakt van data over ervaringen van verzekerden met zorgverzekeraars, verzameld met de CQ-index Zorg en Zorgverzekering in 2005. De ervaringen van 11.539 verzekerden binnen 27 zorgverzekeraars werden geanalyseerd. We keken daarbij naar de invloed van de volgende respondentkenmerken: leeftijd, zelfgerapporteerde gezondheid, opleiding, geslacht, etnische achtergrond en urbanisatiegraad van woonplaats. Vier uitkomstmaten van het meetinstrument stonden centraal in deze analyses. Ook is aandacht besteed aan de effecten op daadwerkelijke keuze-informatie die met het instrument wordt gecreëerd.

In hoofdstuk 3 werd de invloed van case-mix correctievariabelen op ervaringen van zorggebruikers nogmaals bekeken, maar dan per zorgaanbieder. Als er voor case-mix invloeden wordt gecorrigeerd, dan geeft de resulterende informatie een gemiddelde prestatie weer voor een gemiddelde zorggebruiker. Men krijgt dan geen inzicht in de ervaringen van verschillende patiëntensubgroepen binnen de zorgaanbieders of zorgverzekeraars. Deze informatie is echter wel interessant voor gebruikers van keuze-informatie. In de in dit proefschrift beschreven studie werden CQI data over huisartsenzorg (verzameld in 2007) gebruikt om de invloed van leeftijd, zelfgerapporteerde gezondheid en geestelijke gezondheid, opleiding, geslacht en etnische achtergrond vast te stellen per huisartsenpraktijk. Er werd naar vijf uitkomstmaten van het meetinstrument gekeken. Per uitkomstmaat werd de variabiliteit van de case-mix associaties tussen praktijken vastgesteld. In totaal werden de ervaringen van 5.473 patiënten binnen 32 huisartspraktijken meegenomen in de analyses.

De twee studies over case-mix correctie methoden lieten zien dat multilevel regressiemodellen een bruikbare methode zijn om case-mix correctievariabelen van CQI gegevens vast te stellen. Multilevel analyses zijn te prefereren boven de eerder gebruikte impact factor methode vanwege verschillende inhoudelijke en praktische voordelen. Zo wordt er beter omgegaan met de clustering van de observaties (de ervaringen van zorggebruikers) binnen groepen en is het een minder arbeidsintensieve methode. Daarnaast lijkt multilevel analyse een veelbelovende methode om meer inzicht te krijgen in systematische verschillen tussen subgroepen zorggebruikers bij verschillende zorgaanbieders. Vooral bij CQI uitkomsten die gaan over de bejegening door zorgverleners is het belangrijk om deze systematische verschillen in kaart te brengen en voor subgroepen uitgesplitste informatie te overwegen.

Presentatiewijzen

Het tweede deel van het proefschrift betrof presentatiewijzen van keuze-informatie in de zorg. In hoofdstuk 4 werd een studie beschreven waarin presentatiewijzen op internationale websites werden bekeken. We stelden vast hoe verschillende soorten keuze-informatie (zoals klinische prestatie-indicatoren en informatie gebaseerd op gebruikersoordelen) werden gepresenteerd. Daarnaast werden benaderingen voor visuele weergave van informatie en doorklikmogelijkheden in kaart gebracht. We verspreidden een korte vragenlijst onder de websites om vast te stellen op basis waarvan de presentatiewijzen waren gekozen. De review van websites liet een grote variatie aan gebruikte presentatiewijzen zien. De conclusie was dat presentatiewijzen meer systematisch geselecteerd moeten worden en dat meer standaardisatie gewenst is.

Hoofdstuk 5 beschreef een experimenteel onderzoek waarin de effecten van specifieke CQI presentatiewijzen werden onderzocht. Er werd daarbij gekeken naar de effecten op een correctie interpretatie en een effectief gebruik van de informatie. Voor de presentatie van CQI informatie kunnen veel verschillende presentatiewijzen worden gebruikt en het is de vraag welke methoden de beste ondersteuning bieden aan zorggebruikers. We maakten gebruik van de conjuncte analyse techniek om de effecten van de volgende vijf presentatie-kenmerken vast te stellen:

1. Een combinatie van sterren en staafdiagrammen versus alleen sterren;
2. Een alfabetische volgorde van zorgaanbieders versus een rangorde van zorgaanbieders;
3. Sterren gebaseerd op absolute scores versus sterren gebaseerd op relatieve scores;
4. Drie sterren versus vijf sterren;
5. Een toevoeging van een waarderingscijfer voor de zorgaanbieder versus geen toevoeging van een waarderingscijfer.

Er werd fictieve CQI informatie over de prestaties van thuiszorgaanbieders gebruikt om experimentele presentatieformats te creëren. De analyses bestonden uit multilevel logistische regressieanalyses met de antwoorden op de formats (N=1.754) genest binnen respondenten (N=438).

Naast de selectie van specifieke presentatiewijzen is er inzicht nodig in percepties en interpretaties van zorggebruikers zelf, om keuze-informatie aan te passen aan menselijke informatieverwerkingsstrategieën. In hoofdstuk 6 testten we daarom drie bestaande websites die keuze-informatie in de zorg presenteren:

1. www.kiesBeter.nl;
2. www.independer.nl;
3. www.consumentenbond.nl.

Deze websites boden zowel CQI informatie als andere soorten informatie aan. We maakten gebruik van cognitieve interviews, waarin de nadruk lag op het hardop denken van geïnterviewden en op hun antwoorden op verdiepende vragen (doorvragen). Er werden vragen gesteld aan de geïnterviewden (N=20) over hun eigen evaluaties en gedachteprocessen. De analyses bestonden uit beschrijvende thematische analyses van de data, waarbij zowel open als axiaal coderen centraal stonden. Uit de betekenisgeving die geïnterviewden gaven aan de informatie werden de meest belangrijke thema's gedestilleerd en geïnterpreteerd.

De hoofdstukken 5 en 6 lieten zien dat de presentatie van keuze-informatie verbeterd kan worden. De volgende presentatiewijzen werden specifiek aanbevolen: een combinatie van sterren en staafdiagrammen, een driesterren-systematiek, geen toevoeging van een waarderingscijfer, korte samenvattende informatie en doorklikmogelijkheden naar achterliggende informatie. Naast deze aanbevelingen was een belangrijke conclusie van de studies dat verschillende informatieverwerkings- en beslissingsstrategieën worden gebruikt door zorggebruikers wanneer zij keuze-informatie bekijken. De strategieën verschilden zowel voor individuen als voor de specifieke instructies die bij het onderzoek hoorden.

Specifieke kwesties waar websites en toekomstig onderzoek meer aandacht aan zouden moeten schenken zijn:

1. De integratie van verschillende soorten informatie en daaraan gerelateerd de hoeveelheid informatie die gepresenteerd wordt;
2. Het linken van keuze-informatie aan alternatieve soorten informatie, zoals ervaringsverhalen op internet;
3. Het geven aan evaluatieve betekenis aan kwantitatieve informatie in plaats van alleen getallen op het web zetten;
4. De leesbaarheid en begrijpelijkheid van specifieke kwaliteitsindicatoren en het algemene concept 'kwaliteit van zorg'.

Implicaties voor beleid en praktijk

In de discussie van dit proefschrift concentreerden we ons op de vraag hoe de belangrijkste aanbevelingen uit de verschillende studies geïmplementeerd kunnen worden (hoofdstuk 7). Voor dat doel werden eerst de belangrijkste bevindingen uit het proefschrift samengevat en werden verschillende dilemma's die eruit voortkwamen uitgebreid beschreven. Die dilemma's voor beleid, praktijk, en onderzoek werden vervolgens gerelateerd aan de beleidsdoelen van openbare keuze-informatie in de zorg.

Op basis van de belangrijkste bevindingen van de vijf studies werd in hoofdstuk 7 aandacht gevraagd voor de volgende dilemma's:

1. Het belang van eerlijke vergelijkingen tussen zorgaanbieders tegenover de wens om nog aan het publiek uit te kunnen leggen hoe informatie gecorrigeerd is voor case-mix invloeden;

2. De wens om databewerking- en presentatiewijzen te standaardiseren versus de wens om informatie op maat te leveren;
3. De wens om informatie levendiger te maken of 'in te kleuren' tegenover de behoefte aan beknopte overzichten;
4. De wens om verschillende soorten informatie te presenteren (informatie van zorgaanbieders zelf, CQI informatie, informatie over leveringsvoorwaarden) en tegelijkertijd geen tegenstrijdige informatie te willen aanbieden.

Toekomstige onderzoeksresultaten zullen meer richting geven aan de oplossing van de dilemma's. Naast onderzoek is het echter ook nodig om een discussie over de dilemma's onder beleidsmakers, beheerders van websites en onderzoekers op gang te brengen.

Algemene conclusies

Dit proefschrift heeft laten zien dat multilevel regressiemodellen een zeer bruikbare methode zijn en dus de standaard zouden moeten vormen voor het bepalen van case-mix correctievariabelen in metingen van gebruikersoordelen over de zorg. Daarnaast zijn multilevel random slope analyses een veelbelovende methode om de invloed van case-mix correctievariabelen meer systematisch per zorgaanbieder te bekijken. Dit laatste is belangrijk in het kader van discussies over systematische respons bias versus verschillen in de kwaliteit van de ontvangen zorg, en de bruikbaarheid van voor subgroepen opgesplitste keuze-informatie. In dit proefschrift werd verder geïllustreerd dat op dit moment grote hoeveelheden complexe keuze-informatie worden gepresenteerd aan zorggebruikers. Er kwamen echter wel meerdere effectieve presentatiewijzen naar voren die zorggebruikers ondersteunden. Kort samengevat werd er in dit proefschrift met behulp van verschillende onderzoeksmethoden wetenschappelijk bewijs gevonden voor de adequaatheid van analysetechnieken en voor de effectiviteit van presentatiewijzen. Dit wetenschappelijk bewijs is noodzakelijk om openbare rapportage van gebruikersoordelen in de zorg en andere keuze-informatie verder te funderen.

De implementatie van de effectief gebleken methoden verdient verdere aandacht. Verschillende partijen die in Nederland met de CQ-index werken kunnen hun voordeel doen met de aanbevelingen uit dit proefschrift. Het Centrum Klantervaring Zorg (CKZ) kan via haar wetenschappelijke adviesraden bijvoorbeeld bepaalde methoden aanbevelen of verplichten aan onderzoekers en meetbureaus. Ook kunnen websites gebruik maken van de voorgestelde effectieve presentatiewijzen om hun informatie aan het publiek aan te bieden. Het is echter belangrijk om de conclusies in de context van heldere beleidsdoelen te bezien, zoals beargumenteerd in hoofdstuk 7. Zoals recentelijk werd benadrukt in een commentaar van Ginsburg en Kemper (2009) is het doel van *"turning passive patients into active consumers"* een tamelijk vaag doel. Om patiëntenemancipatie te bewerkstelligen lijken andere vereisten noodzakelijk dan voor succesvolle gereguleerde marktwerking in de zorg. Redenerend vanuit het perspectief van gereguleerde marktwerking (het vertrekpunt van onze studies), zou men verder moeten zoeken naar weloverwogen analysetechnieken, design en implementatie van keuze-informatie in de zorg. Naast aandacht voor openbare rapportage aan zorggebruikers dient er meer aandacht geschonken te worden aan rapportagesystemen voor zorgmanagers, zorgverleners en zorgverzekeraars. Op die manier wordt breder inzicht verkregen in de voorwaarden voor en de effectiviteit van selectie- en veranderingsmechanismen binnen het zorgstelsel.

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Curriculum Vitae

Olga Damman (1981) studied Social Psychology at the University of Amsterdam in the Netherlands. After graduating cum laude, she started working at NIVEL (Netherlands institute for health services research) in Utrecht in 2006. Her research topics at NIVEL in the period from 2006-2009 were quality of care from the patient's perspective, the Consumer Quality Index (CQ-index), public reporting in healthcare, and informed decision making. Currently, Olga is working as a researcher at the Department of Public and Occupational Health and the EMGO Institute for Health and Care Research, VU University Medical Center in Amsterdam, where she is involved in research on risk communication and decision making in health checks.

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