The use of information in online healthcare provider choice

Abstract. In order to evaluate and facilitate the provision of health information online, we must first understand how it is perceived by those who use it. Two important considerations in research on patients' information use in online healthcare provider choice are the need for a conceptual framework for studying information types and methods for studying information use. Therefore, our first contribution lies in using Donabedian's structure-process-outcome model of healthcare quality to identify specific patterns of preference and information use in online healthcare provider choice, and differences in information use between two healthcare provider types. Our second contribution lies in identifying differences in results between data collection methods (importance rating/selection, concurrent self-report of online information use and retrospective information use) in relation to choice tasks. In a mixed-methods design, provider type (primary and secondary care) was systematically varied during participants' use of the infomediary NHS Choices. Participants preferred process topics over structure topics, in contrast with the results of concurrent and retrospective self-report. We conclude that the differences in results between the types of data collection method reflect underlying differences in choice task. Future research should address the use of novel infomediary user-interfaces, and infomediaries in relation to the use of other information sources and (e-)health literacy.

Keywords

Online health information; online search; patient education; infomediary; choice

Highlights

Donabedian's model is appropriate to analyse online health information and its use

Donabedian's model should be considered in the design online health information

Users' expressed preference for process topics does not fully match their behaviour

The extent of the match potentially depends on the healthcare domain

1. Introduction

In the United Kingdom (UK) Choose and Book (an electronic scheduling system that was incepted in 1998; Department of Health, 2009) supports patient choice of provider via the Internet, which actively encourages patients to engage in decisions about where (provider) and when (timing) they receive healthcare. In the UK National Health Service (NHS) Plan, patient choice of provider remains a core policy strategy by stimulating competition between NHS-funded providers to reduce inequities in access to care and improve both the efficiency and the quality of services to patients (Department of Health, 2000). By responding to patients' concerns, their demand for high-quality services can be increased (Santos et al., 2013).

Research undertaken in the UK has indicated that up to 75% of patients consider choice to be important in specialist healthcare. The following groups place a higher value on choice: older patients, patients with low educational attainment, patients from mixed or non-white backgrounds and patients with generally bad experiences using their local hospital (Dixon et al., 2010; Laverty et al., 2015). However, when patients are offered a choice of provider, a substantial majority (69%) choose services in close proximity to their homes (Dixon et al., 2010).

There are two major prerequisites for enabling patients to make an informed choice of provider. Firstly, patients must be aware that they have, and can exercise a choice, and secondly, patients must be able to effectively weigh up the trade-offs between the wide array of metrics on provider performance conveyed by online information providers ('infomediaries'). Dixon et al.'s (2010) finding that patients predominantly choose a local provider may indicate that at least one of these conditions is not fulfilled. One such health infomediary set up by the UK Department of Health is NHS Choices (*http://www.nhs.uk/pages/home.aspx*), which provides information on the characteristics of healthcare providers to support patients' choice of provider.

2. Background

The way information is used and the way that information is provided are a means of ensuring effective communication that can lead to enhanced care quality by

improving choice of healthcare provider. Navigating suitable information as a means of improved decision making towards selecting healthcare is particularly salient for the protection of vulnerable groups of patients who lack the resources necessary to make effective choices for their personal well-being. For example, health infomediaries that provide clarity and trustworthiness of information can facilitate choice of care provider. Hence we focus on what information is provided in a healthcare infomediary and how this is used. Here we review existing work related to health information use, health infomediaries and, based on this, present the rationale for our study as well as its research questions and aim.

2.1. Health information use

Two important considerations in the study of patients' information use in online healthcare provider choice are, first, the need for a conceptual framework for studying information types and, second, methods for studying information use. Models of information use from information science explain and describe the process of information-seeking (Johnson's comprehensive model of information seeking [Johnson & Case, 2012], Robson & Robinson's [2013] information seeking and communication model; Shenton & Dixon's [2009] models of information seeking; Zach's [2005] information seeking model), but these do not address the selection of different types of health information that are the subject of the current research. Instead, our work draws on relevant research on healthcare provider choice in the context of offline information.

2.1.1. Conceptual framework

Knowledge about how patients use healthcare provider information is important to evaluate and facilitate the provision of healthcare information resources. Victoor et al. (2012) distinguish between comparative healthcare provider information that is offered by the healthcare system and other sources of information that patients use in order to choose a healthcare provider. Victoor et al.'s scoping review was not specifically focused on online healthcare provider choice by patients, which our research addresses. Nevertheless, they found that patients use comparative offline4 information less than other sources of information (own previous care experience with a specific provider, their general care experiences and social influence). However, recent research found that in older Internet users the most commonly used sources of information in relation to a doctor's appointment were

health professionals, pharmacists and the Internet, and these were also the most trusted sources (Medlock et al., 2015).[1]

Regarding comparative information, patients may take different provider characteristics of healthcare quality into account when choosing a healthcare provider. In their scoping review, Victoor et al. (2012) therefore propose the highly influential structure-process-outcome model of healthcare quality (Donabedian, 2005/1966; see also Table 1, based on Victoor et al., 2012) as a scheme for organising provider characteristics in the study of patients' offline information use. The current study builds on this work in the context of online healthcare provider choice. The first model component is structure (the environment of healthcare organisation or the attributes of settings where services are provided; e.g., appropriateness of facilities and equipment, and the qualifications of staff). The second component is process (the way of healthcare is delivered or attributes of activities for diagnosis and treatment; e.g., clinical-history taking, physical examination and diagnostic tests). The third component is outcome (the effect of care delivered on a patient's health status; e.g., recovery, restoration of function and survival). Donabedian's model has previously been applied not only to managing (Larson & Muller, 2002) and modelling healthcare quality (Mahdavi et al., 2018), and the creation of healthcare quality measures for quality assessment and improvement modelling healthcare quality (Jacobs et al., 2012); it has also been applied to patients' evaluation of hospital care (Aboshaiqah et al., 2016), specifically to compare two hospital types on structure, process and outcome, and, crucially, to analyse provider characteristics in the study of patients' offline information use.

According to this model the outcomes of care (as ultimate quality indicators) are the end goal for patients and the result of care processes (means towards the end goal); these, in turn, are influenced and constrained by structural factors (as further means towards the end goal), thereby indirectly influencing outcomes (Larson & Muller, 2002). Without a healthcare process that uses structure, structure in itself does not produce healthcare outcomes. Rather, process depends on structure to achieve outcomes. Outcomes depend on process and, in turn, structure. Therefore, in the

[1] The analysis included other sources such as health leaflets at a doctor's surgery, family and friends and self-help/support group. The use of Internet information was mainly regarding symptoms, prognosis, and treatment options. Information from healthcare professionals was mainly regarding prescriptions, side effects, practical care information, and nutritional advice.

causal chain to outcomes, process factors are direct precursors, but structural factors are indirect precursors (through process factors) of outcomes (Larson & Muller, 2002):
healthcare structure → healthcare process → healthcare outcomes

For example, a hospital's mortality rate (outcome) may be low because it operates procedures to promote cleanliness (process explanation). For another example, the success rate (outcome) of a particular operation in the hospital may be high because of appropriately highly trained staff (structure explanation) and these staff following appropriate high-quality operation procedures (process explanation). Other factors (social and environmental conditions and patient risk factors) also influence healthcare outcomes, but normally these cannot be controlled by the healthcare system (Larson & Muller, 2002; Mahdavi et al., 2018).

From Donabedian's model, it is reasonable to infer that the process factors should be more influential in patients' healthcare provider choice than structural factors, and outcomes should be most influential. However, this will also depend on other factors. A first factor is the availability of information about structural factors, and process- and outcome factors; if particular information is not available to patients then they cannot use it or make correct inferences about this information (Kahneman, 2011; Kusev et al., 2016; Martin et al., 2017). A second factor is comprehensibility; if patients do not understand particular information then they cannot use it; instead they may use, other information that is more readily understood (a substitution effect; Kahneman, 2011) or recently experienced (Kusev et al., 2018). From patients' perspective, an advantage of using outcomes to choose a healthcare provider may be that they are more relevant and comprehensible than structure or process, as these are diverse and how they influence outcomes may not always be obvious.

2.1.2. Comparative-information use

Regarding comparative information, a scoping review of the determinants of patient choice of healthcare providers found that structural factors have received the most research attention, with process factors and outcome factors in second and third place, respectively (Victoor et al., 2012). However, the latter scoping review did not

analyse the relative importance that patients attach to the different factors or online healthcare provider choice.

In the various studies that have examined the relative importance of healthcare provider factors in provider choice by patients, different methods have been used to study patients' information use, but often only one method was used and methods were not studied together in the context of online information. This is important because the results may differ between methods; these include actual information use (Fischer et al., 2015), patients' retrospectively self-reported use (Damman et al., 2009), patients' ratings or selection of topics for their importance (Abraham et al., 2011), multiple secondary data sources (Santos et al., 2013), discrete choice experiments (Groenewoud et al., 2015) and qualitative interview data (Fasalo et al., 2013).

Structural factors. Existing research has demonstrated that patients prefer healthcare providers close to home, practices with higher proportions of female GPs, higher proportions of GPs that qualified in Europe and lower average GP age (Santos et al., 2013). Insurance status of provider and availability of appointments are highly influential factors in patients' choice of healthcare provider or physician (Abraham et al., 2011). Patients consider physicians' quality (measured as a combination of structural and outcome factors) is one of the most important factors in choosing a surgeon (Bozic et al., 2013) and, initially, an important factor in choosing a healthcare provider for a 'serious, but non-urgent health problem' (Fasalo et al., 2013). Patients consider expertise the most important factor in choosing a healthcare provider for Alzheimer's disease (Groenewoud et al., 2015). The standard of facilities is among the most influential in patients' healthcare provider choice for elective treatment (Laverty et al., 2013)

Process factors. Existing research has demonstrated that patients consider the manner of physicians (e.g., spending adequate time answering questions, communicating clearly, valuing patients' opinion) (Bozic et al., 2013) as one of the most important factors in choosing a surgeon. Patients consider safety as one of the most important for choosing for choosing a healthcare provider for knee arthrosis, and continuity of care and relationship with the therapist for chronic depression (Groenewoud et al., 2015). Quality of care and cleanliness are among the most

influential in patients' healthcare provider choice for elective treatment (Laverty et al., 2013).

Outcome factors. Existing research has demonstrated that patients prefer a higher quality rating in terms of increased earnings under the Quality Outcomes Framework (a pay-for-performance initiative in UK primary care) (Santos et al., 2013). Patients consider treatment effectiveness as one of the most important factors in choosing a healthcare provider for knee arthrosis (Groenewoud et al., 2015).

2.2. Health infomediaries

Health information for patients is often available on Internet sites. Specifically, a health infomediary is defined as an online service that offers advice, guidance and assessment on health and wellness information, including referrals for outpatients (Zahedi & Song, 2008). Health infomediaries are increasingly important providers of health information to patients and the general public. Research has shown that health infomediaries are used by patients to guide their use of primary care services (Murray et al., 2011). However, there is a need for research evaluating the information use by patients who are accessing health infomediaries for healthcare provider choice (Fischer et al., 2015), and this is what our research addresses.

Human-computer interaction research has studied health infomediaries in terms of health advice-seeking and trust over time (Sillence et al., 2007a), modelling trust in online health advice for different health conditions (Sillence et al., 2006, 2007b, 2007c), modelling information-seeking in relation to health anxiety and Internet efficacy (Lagoe & Atkin, 2015), modelling intentions to engage in health promotion behaviour after infomediary use (Myrick, 2017), modelling intentions to continue online health-seeking in relation to information overload and psychological 'ill-being' (Swar, Hameed & Reychav, 2017) and modelling health-care quality in relation to online health-seeking, mediated by patient's involvement and patient-centred communication (Xiang & Stanley, 2017). Nevertheless, there is a paucity of research specifically on healthcare provider choice. However, using semi-structured cognitive interviews, Damman et al. (2009) studied health insurants' use of three health web pages for healthcare provider choice. Regarding information use, participants considered almost all information important; however, they expressed concern about the quality (completeness and reliability) of the information. A

limitation of this study is that participants responded to only three preselected pages and were not given the choice to select pages themselves.

2.3. Rationale

First, previous data collection methods designed for studying patients' information use in healthcare provider choice have not been systematically compared either offline or online. The use of a mixed-methods design to study patients' information use in healthcare provider choice offers the prospect of advancing our understanding of this use. This is important because the choice task and method of eliciting information preference are likely to be influential.

Second, the structure-process-outcome model offers an attractive scheme for categorising types of provider characteristics that patients use. Patients' use of these information types has been studied, but there is a lack of research on the importance that patients attach to these when using online resources. Existing research has shown various types of information that patients use in offline healthcare provider choice, including factors from Donabedian's model. However, the amount of information available and the way it is selected and presented differ between offline and online resources; therefore, offline results may not be applicable into the use of online resources.

Despite the introduction of NHS Choices in the UK, there is a scarcity of research investigating online healthcare provider choice by patients and specifically the information they use (Henke et al., 2011). The current study addresses this gap by studying the information that users of this infomediary employ when choosing a healthcare provider.

Victoor et al.'s (2012) scoping review proposes to use Donabedian's model to analyse the results of existing research regarding the influence of provider characteristics (categorised as structural-, process- or outcome factors) on patients' offline healthcare provider choice. Building on this work, the current study is novel in two ways. First, we conceptualise laypeople's information use according to Donabedian's (2005/1966) model of healthcare quality to empirically study their information use in online health-care provider choice with a new data set. Second, we use and compare distinct data collection methods (importance ratings,

information selection, concurrent self-reported information use and retrospective self-reported information use) and collect new data to study information use and compare the methods in terms of the pattern of findings. Using different methods is important, as Victoor (2012) identified a potential discrepancy between what patients say and their behaviour regarding information use.

2.4. Research question and aims

In this paper we set out to establish what information people use when choosing a healthcare provider. As discussed, the answer is likely to depend on the method used to answer this question, but previous studies have not systematically compared different methods. Specifically, we address three research questions.

Research Question 1: which provider characteristics do infomediary users consider to be the most important for their choice and do these vary as a result of infomediary use?

Research Question 2: what information do infomediary users employ online in preparation for choosing a healthcare provider?

Research Question 3: what information do infomediary users recall having used in their choice?

3. Method

3.1. Design

A mixed-methods design was used. The independent variable was healthcare provider type (primary care and secondary care[2]). Participants carried out two tasks, one for each type, with task order counterbalanced. The dependent variables were participants' importance rating of information topics for each of the two healthcare provider types and selection of information topic as important. In addition, participants' use of information topics according to their concurrent self-report and their retrospective self-report of information use were recorded.

3.2. Participants

Research ethics approval was obtained from the main researcher's employer [organisation's name masked to facilitate blind peer review]. A sample of 43

[2] In the UK, primary care is the first point of contact for health complaints and, through referral, acts as a filter to more specialist secondary care.

volunteer-participants (36 female, 7 male; 7 non-students from general practice; 36 university students), with mean age 25 (*SD* = 8) were recruited from a general practice and a university.[3] A majority (24) of participants had completed higher-secondary education ('A-levels') as highest education level; other highest education levels included lower-secondary education (2, GCSE), vocational education (2, NVQ), degree (7) and higher degree (2). Most were white British or Irish (34); other ethnicities included African (2), Chinese (2) and Bangladeshi (1). All were regular Internet users (at least once a day), with Internet experience varying from 1-2 years to over 10 years.

3.3. Experiment software and materials

For data collection, a Windows form application was designed and developed in Visual Basic. The application had two sections, based on the infomediary NHS Choices (in the format it was available during October-December 2015). In each section, a healthcare provider choice task was presented, based on a scenario. In the section 'Find GP services' (*http://www.nhs.uk/Service-Search/GP/LocationSearch/4*), 26 general-practice characteristics were presented, organised into seven topic sections (key facts, online facility, patient's experience [overall care], patient's experience [long-term conditions], patient's experience [quality of service], age of patients and use of hospitals; Figure 1). The topics were categorised with the structure-process-outcome model (Table 2). In the section 'Find hospitals – surgical procedures' (*http://www.nhs.uk/Service-Search/Hospital/LocationSearch/7/Procedures*), 17 hospital characteristics for surgery of the lower back were available, organised into four topic sections (key facts, safety, complaints and facilities; Figure 2). The topics were categorised with the structure-process-outcome model (Table 3). In each of the two sections, search results (general practices or hospitals) under each topic could be sorted by the corresponding topic characteristics and by distance[4], with links to web pages of individual healthcare providers.

[3] Power analysis demonstrated statistical power to be > 0.80 for the statistical tests reported in this study for a significance level of 0.05 and a medium effect size ($f = 0.25$).

[4] The topic sections do not necessarily map onto Donabedian's (2005/1966) model components: structure, process and outcome; however, individual topics do map onto these components

3.4. Data collection procedure

Two main tasks ([1] general-practice/primary-care choice and [2] hospital/secondary-care choice) were designed and piloted with four participants; minor changes were then made to the wording of the tasks. Before the main tasks, participants first carried out a practice task on an unrelated website, designed to familiarise them with thinking aloud while using the website to find information. In the general-practice task, participants were required to select an appropriate general practice for themselves to register with, given a scenario in which they had recently moved to Manchester. In the hospital task, participants searched for a hospital to have lower-back surgery, as advised by a medical professional, given a scenario in which they had recently moved to Birmingham. Participants were required to use the appropriate section on the NHS Choices website to aid their decision-making whilst thinking aloud during both tasks; they were free to use the section pages and links from these pages.

Participants rated the importance for choosing a healthcare provider of each of the information topics that were available within NHS Choices for general practices (26 topics) and for hospital departments offering lower-back surgery (17 topics), using a 5 point scale (1 = very unimportant, 2 = unimportant, 3 = neither important nor unimportant, 4 = important, 5 = very important). As another measure of importance, participants also selected up to five of the information topics as important for choosing a general practice and up to five for a hospital department.

Study sessions took place in a quiet room with a personal computer (Intel processor, Windows 7 operating system) that was connected to the Internet. After a general introduction to the study and signing the paper consent form, individual participants proceeded to answer demographic questions (age and gender). The remainder of the procedure is presented in Table 4.

Next, participants completed the second healthcare-provider choice task following the same procedure. To avoid fatigue, a maximum of 25 minutes in total was set for completing the two tasks. As a result of the time limit, 4 participants did not or not fully complete the hospital task because they ran out of time; therefore, the data from who 43 completed the general-practice task and from 39 who fully completed the hospital task were analysed.

3.5. Data analysis

In relation to Research Question 1, the effects of type of information topic (structure and process) and time (before and after choice of a healthcare provider) on importance ratings and topic selection were tested using 2-way repeated-measures analysis of variance (ANOVA) techniques.

In relation to Research Questions 2 and 3, audio recordings of concurrent think-aloud (narratives) by participants were transcribed verbatim and thematic analysis (Braun & Clarke, 2006) was conducted on the concurrent self-reports of information use and retrospective self-reports[5]. Thematic analysis is a flexible method to identify patterns in qualitative data (Braun & Clarke, 2006). We chose this method to analyse the different types of information use data collected in this study, as we wanted to identify patterns in information use in the two tasks.

One researcher conducted the analysis on all narratives and a second coder independently analysed 10 transcripts (5 general practitioner, 5 hospital). Thematic analysis was conducted on all narratives following the step-by-step guide provided by Braun and Clarke (2006). The first step involved immersion in the data which occurred through the transcription process (Riessman, 1993), and repeated reading of the transcripts. The second step of analysis involved developing codes that were data-driven and identifying interesting features of the data (Braun & Clarke, 2006). As recommended by Victoor et al., we used Donabedian's structure-process-outcome model of quality care as a conceptual framework for deductive coding (Tables 1, 2 and 3). We added to this further themes from the literature (Fischer et al., 2015) and any themes that emerged during the analysis process. Therefore, we used both a priori (deductive) and emergent coding (Pope & Mays, 2006). The third step of analysis focused on analysing the data at a broader level and the frequency of each theme within the data was also recorded. The fourth step of analysis involved reviewing the themes. To achieve this, both coders identified common themes, and met to discuss and resolve discrepancies in findings. There were very few discrepancies and agreement was reached by both researchers on all themes. Therefore, the final step in analysis involved defining and refining themes by

[5] both reasons for choice on choice task completion and specific reasons after task completion.

providing a description of each theme and determining which aspects of the data were captured by each theme.

4. Results

We present results of preference of information type (Research Question 1), information use (Research Question 2), reasons for use (Research Question 3) and the comparison of these three.

4.1. Research Question 1: what types of information do infomediary users prefer?[6]

4.1.1. General-practice task

Process topics (process of general-practice care delivery) were rated as more important than structure topics (organisation of general practice) (Table 5), both before (d = 1.31) and after infomediary use (d = 1.28). Two-way repeated-measures ANOVA showed that the main effect of model component (structure and process) was significant, F (1, 40) = 81.84, partial eta squared = .66, p < .001. Not significant were the main effect of infomediary use (before and after infomediary use), F (1, 40) = 3.36, partial eta squared = .07, p = .07, or the interaction effect between model component and use, F (1, 40) = 1.26, partial eta squared = .03, p = 0.27.

Further analysis examined individual factors (Table 6). Pairwise comparisons between the topics (with Bonferroni correction) showed that the most influential *structural* factors were availability (acceptance of new patients) and accessibility (distance to practice). Furthermore, of the *process* factors, the most influential ones were information provision (the percentage of existing patients who felt that they had the results of tests or treatments explained well) and communication (the percentage of patients who felt they were listened to) (before infomediary use).

The results for selection of information topics by participants showed the same pattern (Table 5): process topics were selected statistically significantly more frequently than structure topics, both before, t (42) = 4.12, p < .001, d = 1.24, and after use, t (42) = 6.08, p < .001, d = 1.82.

[6] Twenty-two participants had used the infomediary NHS Choices (used in the study) before, and 21 had not. Before conducting the analysis of variance (ANOVA) reported in this section, we analysed user status as an additional factor. The main effect of user status and its interaction effects with infomediary use and model component (structure and process) were not significant, so in the sequel only the findings of the full sample are presented without user status as an additional factor.

4.1.2. Hospital task

Process topics (process of hospital care for lower-back surgery) were rated as more important than structure topics (hospital organisation of lower-back surgery) (Table 7), both before (d = .99) and after infomediary use (d = 1.04). Two-way repeated-measures ANOVA revealed a statistically significant main effect of model component, F (1, 40) = 38.21, partial eta squared = .49, p < .001. Not significant were the main effect of infomediary use, F (1, 40) = 0.76, partial eta squared = .02, p = .39, or the interaction effect between model component and use, F (1, 40) = 0.29, partial eta squared = .01, p = 0.59.

Further analyses examined individual factors (Table 8). Pairwise comparisons between topics (with Bonferroni correction) showed that the most influential *structural* factors were availability (safe staffing), accessibility (distance to travel to hospital) (before and after infomediary use) and provider's experience (the number of operations carried out per year) (after use). Furthermore, the most influential *process* factor was the implementation of rules or activities to deliver good care (the infection-control-and-cleanliness rating of a healthcare provider) (before infomediary use).

Selection of topics by participants showed the same pattern (Table 7): process topics were selected significantly more frequently than structure topics, both before, t (42) = 4.45, p < .001, d = 1.25, and after use, t (40) = 4.74, p < .001, d = 1.40.

4.2. Research Question 2: which online information do users employ in preparation for choosing a healthcare provider?

4.2.1. General-practice task

Thematic analysis of concurrent self-report of information use revealed that six topics of information on the NHS Choices infomediary were used by over 50% of participants (discussed below; see also Table 9). For further topics, see Online Appendix OA2.

Structure. The most common structure topics were online facilities (NHS Choices showed whether each general practice offered appointment booking online, the capability to order or view repeat prescriptions online and view test results online) and number of registered patients (both used by 70% of participants). The distance

to the general practice was used by 67% of participants to include or exclude practices. Fifty-one per cent of participants used opening hours, which they could select to be displayed per general practice; however, not all practices listed their opening hours. Other commonly used topics were accepting new patients (46%), personal needs and preferences, and staff (both 44%)

Process. The most commonly used information was the NHS Choices users' overall rating (77%). This star rating was provided by current users of the general practice. Also frequently used was recommendation/performance (70%) and the results from the GP Patient Survey that were published on the NHS Choices infomediary. Reviews by existing or previous patients and quality of care/service were also used by 40% and 33% of participants, respectively.

Comparison of information types. Although process topics were rated as more important (Section 4.1.1), structure information topics were used more frequently (269 times) than process topics (133).[7]

4.2.2. Hospital task

Thematic analysis of concurrent self-report of information use revealed that five topics of information were used by over 50% of participants (discussed below; see also Table 10). For further topics, see Online Appendix OA3.

Structure/process/outcome. The UK Care Quality Commission (CQC) monitors, regulates and inspects services based on their treatment, care and support (Care Quality Commission, 2017). The NHS Choices infomediary provides a CQC rating for each hospital (based on structure, process and outcome indicators), which was used by 56% of participants. Twelve per cent of participants also used the link to CQC profiles and full reports on hospitals (12%).

Structure. The number of procedures (surgery on the lower back) carried out each year was used by 56% of participants. The travelling distance to the hospital was used by 51% of participants.

[7] Because each participant could make use of several information topics or none and because participants had to select topics themselves rather than respond to a controlled presentation of all topics, statistical testing of differences between the three model components would not be meaningful.

Process. The NHS Choices infomediary showed the waiting time for first outpatient appointment and the waiting time from GP referral to treatment. This information was used by 66% of participants. The NHS Choices infomediary showed whether hospitals had looked at, approved or verified the data about them that were presented on the site. This information was used by 56% of participants, but was removed from the infomediary (January 2016) after data collection had finished.

Comparison of information types. Although process topics were rated as more important (Section 4.1.2), structure information topics were used about equally frequently (158 times) as process topics (156), with outcomes (26) in third place.

4.3. Research Question 3: for what reasons do users report they choose a healthcare provider?

General-practice task. From participants' retrospective self-report, the most commonly used information topics as reasons for their choice, were NHS Choices users' overall rating (process; self-reported by 44% of participants), distance to travel (structure; 42%) and online facilities (structure; 33%); for further reasons see Online Appendix OA4. Although process topics were rated as more important (Section 4.1.1), structure information topics were retrospectively self-reported most frequently as reasons for choice (58 times), followed by process topics (44).

Hospital task. From participants' retrospective self-report, the most commonly used information topics for choice were waiting times (process; 29%), number of procedures/year (structure; 24%), distance to travel (structure, 24%) and CQC Rating (and report) (structure/process/outcome; 24%); for further reasons see Online Appendix OA4. Consistent with preference ratings in favour of process topics (Section 4.2.1), process information topics were most frequently retrospectively self-reported as reasons for choice (52 times), followed by structure topics (42) and outcome topics (10).

4.4. Do users' ratings, retrospective self-reports and concurrent self-reports concur?

Findings from concurrent self-report of information use (Section 4.2) were compared with those from both retrospective self-report (Section 4.3) and importance ratings (before and after use of NHS choices) with regard to information to choose a provider (Section 4.1). Full comparisons are presented in Online Appendix OA5.

General-practice task. On average, the number of times participants concurrently self-reported to use a topic (7.35) was 3.5 times larger than the number of times a topic was retrospectively self-reported (2.07).

Generally, the most frequently retrospectively self-reported topics were also the topics most concurrently self-reported (online facilities, distance, NHS Choices users' rating). However, some of the other (most) common topics in concurrent self-reports were infrequent in self-reports (number of registered patients, accepting new patients, personal needs and preferences, and staff) and were not highly rated topics. Furthermore, there was a considerable variability within the importance ratings of the (most) common topics in concurrent self-reports, ranging from close to the average of the mean ratings over topics to close to the maximum scale value. However, the most common topics in self-reports were not consistently the highest rated.

Hospital task. On average, the number of times participants concurrently self-reported to use a topic (7.18) was 3.6 times larger than the number of times a topic was retrospectively self-reported (2.02).

Generally, the most frequent topics in retrospective self-reports were also the topics most frequent in concurrent self-reports (CQC Rating and Report, number of procedures; distance; waiting times). However, some of the other commonly concurrently self-reported topics were infrequent in retrospective self-reports (facilities, organisation has looked at, approved or verified data; NHS Choices users' rating) and were not the most highly rated topics. Again, the most common topics in self-reports were not consistently the highest rated.

Over the two tasks, these findings indicate differences between concurrent self-report of information use, and retrospective self-report and importance ratings for the topics that were most frequent in concurrent self-reports. A summary is presented in Table 11.

5. Discussion

Our work contributes two types of novel finding. First, we identify specific patterns of preference and information use in online healthcare provider choice, and differences in information use between two choice tasks, whereas previous research had not

analysed online choice or preference and information use together. Second, we identify differences in results between data collection methods (importance rating/selection, concurrent self-report of online information use and retrospective information use) in relation to choice tasks, whereas previous research had not systematically compared data collection mixed methods.

5.1. Importance rating and selection of information for provider choice

In relation to Research Question 1, specifically, according to the rating and selection results for both general practice and lower-back surgery, participants considered process topics as more important than structure topics for online healthcare provider choice. The difference was consistent over time as a result of infomediary use. Within either topic information type, ratings were stable. Although, overall, process information topics were rated as more important than structure information topics, there were highly rated topics among both information types, but there were more common among process topics.

Our finding that process topics were rated as more important than structure topics across two choice tasks is consistent with Donabedian's structure-process-outcome model (2005/1966). Process factors influence outcomes directly, while structural factors only influence outcomes indirectly through process factors. Therefore, consistent with our rating results, process information should be more relevant for patients (as they offer experiences closer to outcomes) and this should be used more frequently than structure topics. Moreover, NHS Choices offered more structure topics (14) than process topics (12) for the general-practice task, highlighting a potential mismatch between users' priorities and the information provided.

5.2. Concurrent and retrospective self-report of information use

In relation to Research Question 2, we consider *concurrent self-report* of information topics during infomediary use in preparation for choosing a healthcare provider. In the general-practice choice task, structure topics were used over twice more frequently than process topics in online healthcare provider choice. Nevertheless, in the hospital task, structure topics and process topics appeared in concurrent self-reports about equally frequently.

In relation to Research Question 3, we consider *retrospective self-report* information topics as a reason for healthcare provider choice. In the general-practice task, structure topics were used over 30% more frequently than process topics. Nonetheless, in the hospital task process topics were used over 20% more frequently than structure topics according to retrospective self-report.

For comparison with these findings, the actual number of structure topics on the home page of the NHS Choices GP section (14) exceeded the number of process topics (12). Moreover, the number of process topics on the home page of the NHS Choices hospital section (11) was greater than the number of structure topics (6). As this frequency pattern of information topics does not match the relative frequency of concurrent or retrospective self-reported, differences in use cannot be explained by availability of topic types, at least not for the general-practice task.

The difference in participants' information use between the two tasks may be explained by the content of the task in relation to the structure-process-outcome model. The hospital task involved choosing a provider for a specific health condition and appropriate treatment – in this case lower-back surgery was mentioned as the appropriate treatment. Therefore, the task description could present a priming effect (Kahneman, 2011), whereby treatment (i.e., lower-back surgery) triggers the consideration of process topics in the hospital task. As a consequence and consistent with our results, infomediary users will then use process topics more, or at least not less, in this context. By contrast, in the general-practice task no specific health condition or appropriate treatment were mentioned, and therefore the consideration of process topics may not be triggered to the same extent. Alternatively, the information use results for the hospital task are consistent with the idea that, in general, compared to the task of choosing a general practitioner, process topics may be seen as more relevant to use when choosing a hospital. This is because, at the time of choice, the chooser may consider or require medical treatment or tests for a specific health condition.

5.3. Comparison of data collection methods

Although there was some overlap in information topics between people's concurrent and retrospective self-report, the analysis of concurrent self-reports uncovered more unique topics than the analysis of retrospective self-reported use, as some of the

topics included in concurrent self-reports were infrequent in or absent from retrospective self-reports. The smaller unique set of topics yielded from retrospective self-reported use may be due to limitations of reduced recall from the tasks (Howes et al., 2001), incorrect recall or a preference for information topics that participants, nevertheless, did not use in making a choice. However, the participants seemed fully and genuinely engaged in the tasks. Therefore, it is reasonable to assume that they did not deliberately provide invalid data about their information use.

Regarding topics that were both rated and concurrently self-reported, in particular on the general-practice task, the set of topics rated as most important differed from the set of topics concurrently most commonly self-reported. We interpret these results as reflecting underlying task differences. Specifically, a particular information topic (e.g., number of registered patients) may be rated as of relatively low importance in a more generally described context (in the rating procedure: choosing a general practice, without a specific context provided). However, that same topic may become relevant and used in a more specific context (e.g., using an infomediary to choose a general practice, as a result of recently having moved to Manchester). Therefore, the infomediary use procedure (comprised of an information location task [Algon, 1997, cited in Li & Belkin, 2008] and a decision-making task [Campbell, 1988]) differs from the rating procedure (judgement task [Campbell, 1988]). Specifically, in the former procedure the particular information topic and several providers' scores on the topic were presented by an infomediary together with specific other information topics and the providers' scores on these topics in a particular context (having recently moved to Manchester). However, in the rating procedure, these task details and context were not available to participants, therefore leading to different responses. In addition, it has been established that responses to judgement tasks can be inconsistent with those to decision-making tasks (preference reversals; Kahneman, 2011). This may further explain the discrepancy between the ratings and self-reports.

Regarding the information use procedure, the concurrent self-reports represented the process of information location (Algon, 1997, cited in Li & Belkin, 2008), while the retrospective self-reports represented the process of subsequent decision-making (Campbell, 1988; Fischer et al., 2015). In the latter process, information topics that

were initially located may be ignored of given a low weighted; consequently, the volume of topics may be reduced and the distribution may change (Fischer et al., 2015).

The differences in results between the three data collection methods should be interpreted in the light of different online healthcare provider tasks that different procedures capture. Therefore, in general it is not possible to designate one method as the best; rather, the choice of method must depend on the purpose of data collection. This recommendation differs from that in other domains, such as usability evaluation (Nielsen & Levy, 1994), where studying online behaviour is generally recommended over retrospective accounts.

Specifically, the rating procedure and the selection procedure captured the preference of (1) desired information to use for healthcare provider choice outside the context of using an infomediary to choose a healthcare provider. Infomediary use involved (2) the exploration of information using a health infomediary in preparation for choice. Retrospective justification of choice involved (3) the use of information in making a choice of healthcare provider after exploration. NHS Choices supports exploration (2) through browsing and search functions, and reviewing relevant information for decision-making (3) through a short-list function, but very few of our participants used this function. This use could be increased by providing specific guidance on how to use the infomediary in preparing for and then making a choice.

Overall, although there was some overlap in topics, our results indicate differences between concurrently and retrospectively self-reported information use. Similarly, there were differences between concurrent reports and ratings. These results are in agreement with previous research that has demonstrated a gap between patients' self-report (expressed preference) and their behaviour (revealed preference) regarding offline information use and healthcare provider choice (Schneider & Epstein, 1998; Schwartz et al., 2005; Dijs-Elsinga et al., 2010; Lux et al., 2011; Marang-van de Mheen et al., 2010).

5.4. Preference for and use of named information topics

Within the two major information types in our results (structure and process), the most preferred and most frequently used information topics discussed here were

consistent with the results of previous research studying offline information. This consistency provides some evidence for transferability of research from offline environments to online environments to support healthcare provider choice.

Structure topics, general practice. Availability (acceptance of new patients) (Grytten & Sørensen, 2009) is essential, as only available providers can be chosen. Accessibility (distance to provider; Dixon et al., 2010; Santos et al., 2013) can facilitate visits to a provider by reducing travel time. The range and quality of facilities (online facilities, such as viewing or ordering prescriptions and viewing test results) (Laverty et al., 2013) may enhance patients' feeling of control and provide convenience by saving time. As an indicator of approval by existing patients, provider size (Dijs-Elsinga et al., 2010) may be seen as a proxy for good-quality care delivery, and stability and reliability. Therefore, in choosing between different institutions, size might also reduce anxiety and serve to reassure patients. In addition, patients may consider size as an indicator of the range and diversity of specialists and/or medical interventions. Convenient opening hours (Albada & Triemstra, 2009) may facilitate patients' satisfaction and also make care more accessible.

Structure topics, hospital. Although they are not indicators of care delivered, availability of sufficient staff per patient (safe staffing) (Vonberg et al., 2008) and a provider's experience (number of operations carried out) (Laverty et al., 2013) can provide confidence in their ability to deliver good-quality care (trust) and produce a good treatment outcome. As hospitals are sparser than general practices, hospital accessibility (distance to provider) can facilitate visits even more by reducing travel time.

Process topics, general practice. Both information provision (results of tests and treatment explained well) (Morrison et al., 2003) and communication style (patients being listened to) (Bozic et al., 2013; Groenewoud et al., 2015) can enhance the quality of care from the point of view of patients by promoting their understanding and adherence to treatment.

Process topics, hospital. The implementation of rules or activities to deliver good care (infection control and cleanliness) (Laverty et al., 2013) does not in itself guarantee a good care outcome, but can enhance recovery and avoid hospital-

acquired disease. Waiting time (for first outpatient appointment and from GP referral to treatment) (Dijs-Elsinga et al., 2010) can reduce patients' feeling of anxiety.

5.5. Limitations and future work

5.5.1. Information content and access

The infomediary used in this study lacked outcome information and provided more structure than process information.[8] However, according to our analysis of Donabedian's model (Section 2.1) healthcare outcome information should be most influential in patients' healthcare provider choice, followed by process information and structure information in that order. Our participants' preference supported this order in both tasks: they preferred process information over structure information. No (for the general-practice task) or little (for the hospital task) outcome information was available and we acknowledge this as a limitation. A question for future research is whether and where patients acquire this information; this research should also study patients' use of specific (probabilistic) outcome information.

Furthermore, our participants' information use in the online hospital task reflected this preference for process topics. Therefore, relevant outcome, process and structure information should be collected and made available online to support patients' healthcare provider choice. According to Donabedian's model, process factors and structural factors contribute towards achieving health outcomes. Therefore, process- and structure topic information that is relevant to and consistent with a particular achieved outcome provides a potential explanation for, further evidence for, and reinforcement of the outcome information.

Infomediaries should allow users to, first, select information types (attributes) and, second, compare providers on selected attributes. Parallel faceted browsing can support both of these. Infomediaries such as NHS Choices can be described as (non-parallel) faceted browsing systems. They support browsing and comparison choice items (healthcare providers) by a fixed (sub)set of attributes (information topics), with other attributes that are not selectable and visible simultaneously. In contrast, parallel faceted browsers (Jameson et al., 2013) support information selection and comparison on any attributes selected by a user. Therefore, these parallel faceted browsers can provide more flexible support for information use in

[8] At least on the main pages, but on the linked pages of individual healthcare providers some outcome information was available.

online healthcare provider choice and therefore we recommend research into their use to support this choice. However, e-health literacy will need to be addressed as well, as an important prerequisite in terms of interactive search skills that are needed to use these tools effectively, posing a challenge for the design of these browsers.

5.5.2. Infomediary use in relation to other information sources and (e-)health literacy

According to Medlock et al. (2015), the use of verbal resources (health professionals, pharmacists, telephone help lines, radio and television) rather than non-verbal resources (e.g., infomediaries and leaflets) suggests reduced health literacy (the ability to process and understand health information; Griebel et al., 2016) and reduced active information-seeking behaviour. Although infomediaries offer great potential in terms of providing comprehensive comparative health- and healthcare provider information, their effective use requires various skills that not all potential users may possess (Helmsley et al., 2018; Kim & Xie, 2017), in particular health-literacy and e-health-literacy. E-health literacy comprises six subtypes of literacy: traditional literacy and numeracy, health literacy, computer literacy, science literacy, media literacy and information literacy (Griebel et al., 2016). A limitation of the current study is that neither the use of other information sources nor health literacy nor e-health literacy were analysed and our sample was relatively highly educated (mainly students), although information use will depend on a patients' levels of health and e-health literacy. The level of this literacy may affect not only the ability to cognitively assimilate information but also the motivation to seek, acquire and use it. Therefore, the promotion of e-health literacy is an important research topic in relation to infomediary use, as is the design of infomediaries that match the e-health literacy that different patient groups possess. To achieve this match, designers should consider co-design and testing with users (Flynn et al., 2015) possessing a range of literacy levels.

Given patients' use of various information sources (Fischer et al., 2015; Victoor et al., 2012) in addition to comparative online health information, an important research topic is patients' simultaneous and appropriate use of different information sources. Existing research indicates that Internet resources may play a larger role (Medlock et al., 2015) than previously suggested (Victoor et al., 2012). Moreover, the integration of online health information into patients' discussions with healthcare professionals

around decision-making has been highlighted (Bussey & Sillence, 2017) as well as patients' use of online support groups in relation to their health decision-making (Sillence & Bussey, 2017). Therefore, it is essential to study online health information as part of the mix of resources.

6. Conclusions

Although the infomediary NHS Choices supported healthcare provider choice with provider information for users to explore, it did not fully support Donabedian's structure-process-outcome model. In particular, outcome information was largely missing, at least on the main pages, even though this is the ultimate information regarding the success of treatment, and more structure- than process information was provided. In their choice of a general practice, infomediary users predominantly used structure topic information, but when choosing a hospital (to undergo lower-back surgery) they used process topics information more. However, according to users' ratings, they preferred to use process topics in both choice situations. The differences in results between the types of data collection method reflect underlying differences in choice task. Future research should address information content and access, and infomediary use in relation to the use of other information sources and (e-)health literacy.

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Table 1

Structure-, process- and outcome characteristics of health-care providers (extracted from Victoor et al., 2012)

1	Structure: organisation of healthcare
1.1	Availability
1.2	Accessibility
1.2.1	Travel time
1.2.2	Accessibility by own transport or public transport
1.2.3	Parking
1.2.4	Cost (organised or paid for)
1.3	Type and size
1.3.1	Ownership/affiliation
1.3.2	Range and quality of facilities
1.3.3	Provider size
1.4	Staff
1.4.1	Medical qualification/expertise of providers
1.4.2	Experience of providers
1.4.3	Match of provider's specialisation/interest with care needs
1.4.4	Availability of sufficient staff per patient
1.5	Organisation of health care proper
1.5.1	Convenience of time or place or by doctor or choice
1.5.2	Actions to improve service quality and efficiency
1.5.3	Accessibility by phone and Internet
1.6	Costs
1.7	Socio-demographic factors of the provider
1.7.1	Gender
1.7.2	Age

(Table 1, continuing)

(Table 1, continued)

2	Process: care delivery process
2.1	Interpersonal factors
2.1.1	Communication style
2.1.2	Patient's involvement in decision-making
2.1.3	Friendliness of provider atmosphere
2.2	Information provision
2.3	Continuity of care
2.4	Waiting time
2.4.1	Time on waiting list
2.4.2	Time in waiting room
2.5	Quality of treatment
2.5.1	Quality of treatment proper
2.5.2	Delivery of care as agreed
2.5.3	Number of cancelled operations
2.5.4	Implementation of rules or activities to deliver good care
3	Outcome: effect of care delivered
3.1	Mortality
3.2	Other outcomes

Table 2

Structure- and process characteristics in NHS Choices of general practices

	Provider characteristic
1 Structure	Structure: organisation of healthcare
1.1	The percentage of existing patients who were satisfied with the practice opening hours
1.2	The percentage of existing patients who reported that it was easy to get through to the practice on the phone
1.2.1, 1.2.2	The travel distance from your home to the GP practice
1.3.3	The number of patients registered with the GP practice
1.3.3	The percentage of patients registered with the GP practice who are aged 0-14 years
1.3.3	The percentage of patients registered with the GP practice who are aged over 65 years
1.3.3	The number of referrals made using the Choose and Book system
1.3.3	The number of emergency admissions for long-term conditions
1.1, 1.3.3	Whether the GP practice is accepting new patients
1.3.3, 1.4.3	The percentage of existing patients with long-term health conditions
1.3.2	Whether the GP practice offers the Electronic Prescription Service
1.3.2, 1.5.3	Whether existing patients at the surgery are able to book appointments online
1.3.2, 1.5.3	Whether repeat prescriptions can be viewed or ordered online
1.3.2, 1.5.3	Whether patients can view test results online

(Table 2, continuing)

(Table 2, continued)

2 Process	Process: care delivery process
2.1	The percentage of existing patients at the practice who had confidence and trust in the GP they saw
2.2	The percentage of existing patients who felt that they had the results of tests or treatments explained well
2.5	The ratings and reviews of other patients who have used the GP practice
2.5	The percentage of existing patients who would recommend the GP practice to other people
2.5	The percentage of existing patients who felt that their overall experience was good or very good
2.3	The percentage of existing patients who stated that they always or almost always see or speak to the GP they prefer
2.1.1	The percentage of patients who felt they were listened to
2.1.2	The percentage of existing patients who felt they were involved in making decisions with their GP
2.1.3	The percentage of existing patients who felt they were treated with care and concern by their GP
2.1.3	The percentage of existing patients who were satisfied with their experience of making an appointment
2.1	The percentage of existing patients who felt they were given enough time during a consultation
2.5.1	The percentage of existing patients who felt that they could manage their own health

Note . Topics presented on the home page of *Find GP services* .

Table 3

Structure- and process characteristics in NHS Choices of hospitals offering surgery on the lower back

	Provider characteristic
1	Structure: organisation of healthcare
1.2.1, 1.2.2	Distance of the healthcare provider from your home
1.2.3	Number of parking spaces
1.2.3	Number of disabled parking spaces
1.2.4	Average hourly car parking cost
1.4.2	The number of lower back operations carried out at the healthcare provider each year
1.4.4	Whether the healthcare provider meets safe staffing levels
2	Process: care delivery process
2.5	The inspection ratings of the Care Quality Commission
2.5	Whether staff would be satisfied with the standard of care their relative or friend would receive at the healthcare provider if they needed treatment
2.5	Complaints about inpatient care
2.5	Complaints about outpatient care
2.4.1	The average waiting time for the first outpatient appointment
2.4.1	The average time from GP referral to lower back surgery
2.5.1	The percentage of patients admitted to hospital that were assessed for the risk of blood clots
2.5.1	The average number of days people stayed in the healthcare provider when undergoing lower back surgery
2.5.4	Whether the healthcare provider has a good patient safety incident reporting culture
2.5.4	The infection control and cleanliness rating of a healthcare provider This indicator combines patient ratings of cleanliness with the number of reported clostridium difficile and MRSA incidents
2.5.4	Whether the organisation that runs the hospital has checked the quality of data that is published on the NHS Choices website

Table 4

Procedure

Task	Research question
Read instructions for think-aloud task[a] and carry out unrelated practice task while thinking aloud	NA
Healthcare Provider Choice Task 1	
Rate the importance of individual health topics	Research Question 1
Select individual health topics for importance	Research Question 1
Use infomediary to choose healthcare provider while thinking aloud	Research Question 2
Retrospectively justify choice of healthcare provider	Research Question 3
Rate the importance of individual health topics	Research Question 1
Select individual health topics for importance	Research Question 1
Healthcare Provider Choice Task 2	
See Healthcare Provider Choice Task 1	See Healthcare Provider Choice Task 1

[a]See Online Appendix OA1.

Table 5

Descriptives of the importance of general-practice characteristic domains

	Rating				Information selection			
	Before		After		Before		After	
Structure[a]	3.46	(0.48)	3.29	(0.58)	13%	(10%)	10%	(9%)
Process[b]	4.18	(0.62)	4.12	(0.70)	25%	(13%)	27%	(13%)

Note. Figures are mean ratings/percentages selected with *SD* in brackets.

[a]average rating over 14 structure topics

[b]average rating over 12 process topics

Table 6

Descriptives of importance ratings of individual general-practice characteristics by domain

General-practice characteristic	Importance rating				Selection (%)	
	Before		After		Before	After
	mean	*SD*	mean	*SD*		
Structure						
The travel distance from your home to the GP practice	4.33	0.87	4.09	1.02	53.49	46.51
Whether the GP practice is accepting new patients	4.33	0.99	4.35	0.92	18.60	18.60
The ratings and reviews of other patients who have used the GP practice	4.21	0.77	4.40	0.90	34.88	46.51
Whether repeat prescriptions can be viewed or ordered online	4.02	0.96	3.74	1.07	6.98	6.98
Whether patients can view test results online	3.84	0.90	3.67	1.06	16.28	13.95
The percentage of existing patients who were satisfied with the practice opening hours	3.79	1.08	3.84	1.27	9.30	4.65
Whether the GP practice offers the Electronic Prescription Service	3.60	1.14	3.56	1.14	11.63	16.28
Whether existing patients at the surgery are able to book appointments online	3.56	0.98	3.84	1.13	11.63	16.28
The number of referrals made using the Choose and Book system	3.19	1.18	2.74	1.18	4.65	0.00
The number of emergency admissions for long-term conditions	3.16	1.21	2.56	1.16	11.63	2.33
The number of patients registered with the GP practice	2.93	1.20	3.09	1.29	2.33	4.65
The percentage of existing patients with long-term health conditions	2.91	1.13	2.77	1.19	2.33	0.00
The percentage of registered patients aged over 65	2.44	1.26	2.05	1.23	2.33	0.00
The percentage of registered patients aged 0-14	2.21	0.99	1.88	0.91	0.00	0.00

(Table 6, continuing)

(Table 6, continued)

Process						
The percentage of patients who felt they were listened to	4.63	0.72	4.49	0.88	34.88	37.21
The percentage of existing patients who felt that they had the results of tests or treatments explained well	4.60	0.82	4.12	1.10	23.26	30.23
The percentage of existing patients who felt they were treated with care and concern by their GP	4.51	0.83	4.37	0.85	37.21	44.19
The percentage of existing patients who felt they were given enough time during a consultation	4.44	0.85	4.28	0.98	27.91	39.53
The percentage of existing patients who would recommend the GP practice to other people	4.33	0.61	4.35	0.90	16.28	23.26
The percentage of existing patients at the practice who had confidence and trust in the GP they saw	4.33	0.92	4.37	0.85	51.16	41.86
The percentage of existing patients who felt that their overall experience was good or very good	4.28	0.80	4.35	1.00	37.21	30.23
The ratings and reviews of other patients who have used the GP practice	4.21	0.77	4.40	0.90	34.88	46.51
The percentage of existing patients who felt they were involved in making decisions with their GP	4.12	1.07	4.07	1.01	16.28	23.26
The percentage of existing patients who stated that they always or almost always see or speak to the GP they prefer	4.07	1.03	4.00	1.29	20.93	11.63
The percentage of existing patients who were satisfied with their experience of making an appointment	4.05	0.82	4.00	1.05	11.63	16.28
The percentage of existing patients who felt that they could manage their own health	2.60	1.07	2.63	1.18	0.00	0.00

Table 7

Descriptives of the importance of hospital characteristic domains (for lower-back surgery)

	Rating				Information selection			
	Before		After		Before		After	
Structure[a]	3.26	(0.61)	3.16	(0.70)	20%	(12%)	19%	(12%)
Process[b]	3.87	(0.62)	3.82	(0.57)	33%	(06%)	33%	(8%)

Note. Figures are mean ratings/percentages selected with *SD* in brackets.

[a]average rating over 6 structure topics

[b]average rating over 11 process topics

Table 8

Descriptives of importance ratings of individual hospital characteristics (for lower-back surgery) by domain

General-practice characteristic	Importance rating				Selection (%)	
	Before		After		Before	After
	mean	*SD*	mean	*SD*		
Structure						
Whether the healthcare provider meets safe staffing levels	4.28	0.96	4.02	1.08	39.53	29.27
Distance of the healthcare provider from your home	3.86	1.01	3.54	1.29	27.91	24.39
The number of lower back operations carried out at the healthcare provider each year	3.49	1.32	3.80	1.10	41.86	48.78
Number of parking spaces	2.91	1.25	2.56	1.23	9.30	7.32
Average hourly car parking cost	2.88	1.40	2.63	1.32	4.65	4.88
Number of disabled parking spaces	2.30	1.26	2.41	1.28	2.33	0.00
Process						
The infection control and cleanliness rating of a healthcare provider	4.28	1.14	4.24	1.02	62.79	56.10
Whether the healthcare provider has a good patient safety	4.09	1.02	4.05	0.97	41.86	39.02
Whether staff would be satisfied with the standard of care their relative or friend would receive at the healthcare provider if they needed treatment	4.07	1.10	3.85	1.17	44.19	41.46
The inspection ratings of the Care Quality Commission	4.02	1.08	4.22	0.99	48.84	65.85
Complaints about inpatient care	4.00	0.87	3.63	1.04	39.53	21.95
Complaints about outpatient care	4.00	0.82	3.56	1.03	16.28	12.20
The average time from GP referral to lower-back surgery	3.86	1.04	3.95	1.09	27.91	31.71
The average waiting time for the first outpatient appointment	3.84	1.00	3.90	1.04	20.93	26.83
Whether the organisation that runs the hospital has checked the quality of data that is published on the NHS Choices website	3.70	1.17	3.98	1.21	32.56	43.90
The average number of days people stayed in the healthcare provider when undergoing lower-back surgery	3.35	1.09	3.37	1.07	25.58	24.39
The percentage of patients admitted to hospital that were assessed for the risk of blood clots	3.35	1.17	3.27	1.07	2.33	4.88

Table 9

Concurrently reported information use during the general-practice task (n > N/2)

Information	*n*	How Information Was Used	Examples
NHS Choices users' overall rating (P)	33	1 Some participants used the ratings as a basis for their choice. 2 Some participants considered the ratings in relation to other factors such as the number of patients registered at the practice. 3 Participants also used the ratings as an option to sort results by.	1. "Probably choose Urban Village Medical Practice because it's got really high ratings" 2. "Some of the ratings are good, some of them are bad, but somehow the one with 3 stars has more patients than the one with 5 stars"
Online Facilities (S)	30	1 Some participants would use online facilities as inclusion/exclusion criteria for their choice. 2 Participants would also consider the available online facilities in relation to their personal needs and preferences.	1. "They have online booking and you can order or view repeat prescriptions online so I'll add that to shortlist because that sounds good" 2. "There's no electronic prescription service which I would need"
Number of Registered Patients (S)	30	1 The practices which had a high number of registered patients were seen as less favourable by participants than practices which had fewer patients. 2 The number of registered patients was also considered in relation to other factors such as the size of the general practice.	1. "See that was ideal as well as it had less patients. Not going to lose patient track just because it was the second to least one" 2. "all of them have a lot of patients, at least above 2000, most above 5000 so hopefully they're big surgeries"

(Table 9, continuing)

(Table 9, continued)

Recommendation/ Performance (P)	29	1	Participants found general practices with a high number of patients who 'would recommend the surgery' as more favourable.	1. "100% patients recommend this practice so that's good"
		2	Practices which had a high number of 'among the best' ratings were preferred. Practices with 'among the worst' ratings were often excluded by participants.	2. "Let's have a look at their performances, 92%, 81.6% so they're all relatively high"
		3	The system which ranks the providers as 'among the best', 'ok' and 'among the worse' did not seem clear to all participants.	"This one says it's among the worst so I probably wouldn't pick that one"
				3. "How can 96.2% still be considered ok? That is statistically significant"
Distance (S)	29	1	Some participants sought a general practice which was within a specific distance, whereas others would exclude practices which were outside of their accepted distance.	1. "Everything else is too far away"
		2	The distance of the practice was also considered in relation to other factors such as parking and the personal needs or preferences of the participant.	2. "Going to look for something in town because I don't want to go out of town if I'm ill"
Opening Hours (S)	22	1	Participants often made their choice based on opening hours.	1. "The opening times are 8 to half 6 which are convenient. I pick this one"
		2	Practices that were open on an evening and weekend were often considered more favourable.	2. "So they've got longer hours and they've got a late night on a Wednesday which is good"
		3	Participants often considered opening hours in relation to personal needs and preferences such as childcare and work commitments.	3. "It's got 9 till 1 and 2 till 5. Ok that's a bit weird. It's closed on weekends. The only way I could make them is probably a Thursday"

Note. S: structure. P: process.

Table 10

Concurrently reported information use during the hospital task (lower-back surgery) (n > N/2)

Information	*n*		How Information Was Used		Examples
Waiting Times (P)	27	1	Participants would often compare the waiting times between hospitals when making their choice.	1.	"It's got 40 days average waiting time for first outpatient appointment at this department, which seems quite long compared with this one here which is 16 days"
		2	Hospitals with longer waiting times were often excluded in favour of hospitals with shorter waiting times, except in cases where another factor was more favourable e.g. CQC Rating.	2.	"This one is good but just 40 days waiting time. Suppose I'd rather go somewhere good even though it has got a lot of waiting time"
CQC Rating and CQC Profile (S/P/O)	25	1	The CQC rating was used by participants to exclude hospitals if they had not been rated or if they were rated as 'requires improvement' or 'inadequate'.	1.	"The third one requires improvement so that one's out"
		2	Some participants searched for a hospital that had a specific rating and would consider that rating alongside other factors such as reviews.	2.	"Right so the first three don't look as…I'll do the Care Quality Commissions. This one says it's good and this one says it's good"
		3	Some participants would also look at the CQC profile to see a breakdown of each area that is rated.	3.	"I'm going to visit the Care Quality profile to see what it was that they got good on. It seems to be good at caring. Medical care it says requires improvement but everything else seems good"

(Table 10, continuing)

(Table 10, continued)

Number of Procedures (S)	23	1	Participants would often compare hospitals based on the number of procedures they had carried out.	1. "The number of procedures for them both is the same"
		2	Hospitals that had carried out no/few procedures were often excluded in favour of hospitals that had carried out a lot of procedures.	2. "There's a number of operation in each of the hospitals on the lower back. And I think the more operations carried out in the hospital the better"
Organisation has Looked at, Approved or Verified Data (P)	23	1	Participants preferred providers who had looked at, approved and verified their data.	1. "So if I scroll down, one that stands out to me, that's got a green tick under the heading for organisation review of the data published. So that shows to me that the hospitals agreeing with what it says on the website"
		2	Providers who had only looked at, or had not checked their data, would often be excluded.	2. "Why would someone post an organisation that hasn't been looked at and verified?" "The organisation has not looked at or verified…ok I'm not going there"
Distance (S)	21	1	Some participants would consider the type of surgery when assessing the distance of a hospital.	1. "As it's lower back surgery I won't be travelling that much"
		2	Some participants would consider the distance in relation to another factor. For example, some participants would prefer the provider to be close to home but would be willing to travel further if a specific factor was high in a provider that was further away.	2. "However, it's 17.8 miles away. I'd travel further to get good healthcare rather than go somewhere nearer that isn't as good"

Note. S: structure. P: process. O: outcome.

Table 11

Summary of results

Both ratings and topic selection	
GP task	Process topics more important than structure topics
Hospital task	Process topics more important than structure topics
Concurrent self-report	
GP task	Structure topics used far more than process topics
Hospital task	Structure topics and process topics used about equally
Retrospective self-report	
GP task	Structure topics more used than process topics
Hospital task	Process topics more used than structure topics
Concurrent self-report versus retrospective self-report	
GP task	Concurrently reported topics > 3.5 more frequent
Hospital task	Concurrently reported topics > 3.6 more frequent
Frequently concurrently self-reported topics	
GP task	Considerable variability in frequency of retrospective self-report
	Considerable variability in ratings
Hospital task	Considerable variability in frequency of retrospective self-report
	These topics were not the most highly rated
Frequently retrospectively self-reported topics	
GP task	Were not consistently the highest rated topics
Hospital task	Were not consistently the highest rated topics