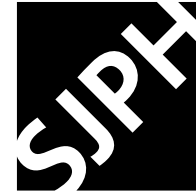


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ORIGINAL ARTICLE

Do surgical patients differ in the way they prioritise aspects of hospital care?

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Abstract

Main objective: To investigate whether surgical patients have the same or different priorities within hospital care by examining whether the importance patients ascribe to different aspects of hospital care can be explained by how important they find aspects of hospitalization in general. **Background:** Few studies have investigated patient priorities within hospital care. Knowledge of patient priorities is important for the purpose of making quality improvements in hospital care. In relation to this, it is important to know whether different groups of patients have qualitative different priorities. **Design and subjects:** A postal questionnaire was mailed to 3676 surgical patients after discharge from five Danish hospitals. Out of this figure, 2380 participated in the survey and 1597 were qualified for inclusion in the analyses. **Analyses:** Data was analysed by graphical loglinear Rasch models. Thirty-six hospital care aspects were included in the final model. **Main results and conclusions:** **To a great extent, patients agreed on the prioritised order of the hospital care aspects investigated. Avoidance of errors and professional health care skills had highest priority. Qualitative differences in priorities were mainly found among different age groups; the younger patients found that information was more important than the older patients, who on the other hand found continuity of care to be more important. Quantitative differences were observed, with patients harbouring different views on of the importance of hospital care in general; on average, women rated this slightly more important than men.**

Key Words: Graphical loglinear Rasch models, hospital care, inpatients, patient experienced quality, patient priorities, surgical patients

Introduction

Awareness of quality experienced by patients in health care service has increased throughout the last decades. Nevertheless, researchers have not paid much attention to patient priorities [1-3]. Patient priorities can be defined as a patient's relative valuation of different aspects of health care [4]. Knowledge about patient priorities is valuable information in order to (a) meet different needs and requirements of different patient groups and (b) inquire about the most relevant aspects in surveys of patient satisfaction and experiences.

An often used method for measuring patient priorities is termed rating, i.e. where the respondent rates each aspect on a scale. When a number of aspects

are rated by a group of respondents, it is possible to determine the prioritised order by the share of the group rating each aspect as important. Often, the existing studies on patient priorities only involve a few aspects of health care [5-6]. This limits the universal validity of the conclusions, since it is only possible to conclude how the aspects are prioritised relative to the (few) other items included in the studies.

This paper distinguishes between two types of differences in priorities between sub-groups of respondents: qualitative and quantitative differences. Qualitative differences indicate that the order of prioritization varies for the sub-groups. For example, that a group of young patients perceive technical aspects of care to be the most important, whereas a

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2 M.G. Iversen *et al.*

group of older patients prioritise continuity of care. Quantitative differences indicate that a group agrees on the prioritised order of the aspects, but differ in their use of the response scale. This can be interpreted as some patients being more demanding than others or that patients have different perceptions of the response scale.

When differences in patient priorities are determined, it is important to consider whether such differences are qualitative or quantitative. If patient X rates an aspect to be more important than patient Y, this may be attributable to the fact that X finds this specific aspect more important or because patient X in general rates aspects about his hospitalization to be more important. To our knowledge, no studies have specifically focused on quantitative differences in patient priorities and we find it highly relevant to explore this area further.

The objective of the article is to test the hypothesis that patients only have quantitatively different priorities. This is done by testing how a defined model matches data. The model maintains that the manner in which the patients prioritise can be explained by their rating on a latent score. The latent score describes how important the patients generally perceive their hospital stay to be.

If the hypothesis cannot be confirmed completely, it will be identified in which areas the data deviate from the hypothesis. Finally, it will be examined what characterises patients with different ratings on the latent score.

Data and methods

Respondents and sample

A postal questionnaire was distributed to all surgical patients discharged from 23 November to 15 December 2005 at five hospitals geographically spread throughout Denmark. Patients subjected to minor surgical procedures or surgery related to pregnancy and reproduction were excluded. Information on patients were retrieved from the National Patient Registry (NPR) and linked with information from the Civil Registration System. The questionnaires were mailed to 3676 patients on 1 March 2006 and a reminder was mailed two weeks later. A total response rate of 64.7% was obtained; 2218 patients answered the questionnaire by mail and 162 answered on the internet.

Development of questionnaire

Results from previous studies were reviewed when selecting central aspects of hospital care.

These studies included a user panel with orthopaedic surgical patients [unpublished], questions developed on the basis of focus group interviews with surgical colorectal cancer patients [7], a questionnaire developed for measuring priorities among orthopaedic surgical patients [8], and the latest Danish National Survey of Patient Experiences [9]. The review resulted in a list of 130 questions. The list was discussed and reduced by a group of researchers in order to avoid overlapping questions. The questionnaire was tested in 14 cognitive interviews with hospitalised surgical patients. The interviews led to a further reduction in the number of questions. The final questionnaire included 41 aspects of hospital care. The questions were formulated as “How important is it for you to... (e.g. that doctors are professionally skilled)?”

Variables

The 41 items were ranked on a five-point scale with the categories “crucial”, “very important”, “important”, “less important”, and “not important at all” or categorised as “not relevant”. In the analyses the first two and the last three categories were grouped in order to obtain a reasonable number of respondents in each category and to simplify the rather complex statistical models. It was carefully considered which of the categories to group according to variation in distribution of the responses and meaningfulness in the interpretation of the results. Two items were excluded from the analysis; one because many of the patients had not answered the question (information about cause of illness) and the other because many of the patients had categorised it as “not relevant” (good collaboration between hospital and local home help at discharge). If these items had been included in the analyses, it would have led to the exclusion of a considerable share of the respondents because the patient is required to have answered all the items to be included in the analyses.

Information about highest education attained, current employment, and overall evaluation of the hospital stay was collected through the questionnaire. Information about gender, age, manner of hospitalization (planned or acute), length of stay, and county of hospital was obtained from the NPR. All these factors were included as exogenous variables.

Data analysis

It was initially assumed that analyses would reveal sub-groups with qualitative different priorities. Preliminary analyses were carried out using latent class analysis (LCA). In LCA it is assumed that a

categorical latent variable is able to explain the co-variation between the manifest variables. However the analyses indicated that the only way the latent groups of patients differed from each other was by the overall degree of importance they ascribed to the questions. No qualitative differences in priorities were found since the prioritised order of the aspects were the same in the different latent groups.

This led to the application of an item response model with a latent continuous variable representing how important the patients in general find aspects of their hospital stay.

All conventional item response models assume:

- (1) Uni-dimensionality (items measure a single underlying dimension).
- (2) Monotone associations between the items and the latent variable (the higher score on the latent variable, the higher possibility of a positive rating of any of the items).
- (3) Locally independent items given the latent variable (dependence between a respondents rating of the different items can be explained by the respondents score on the latent variable).
- (4) Absence of differential item functioning (DIF) (respondents with equal score on the latent variable have the same probability of a certain response to an item regardless of their sub-group membership, e.g. regardless of whether they are men or women).

Note that assumptions (3) and (4) are both assumptions of conditional independence of variables given the latent variable. Assumption (3) assumes that items are pair wise conditionally independent while (4) assumes that items and exogenous variables are conditionally independent.

The hypothesis that only quantitative differences in patient priorities exist were tested by a special case of item response models called Rasch models. In addition to the above mentioned assumptions Rasch models also presume that the raw score is statistically sufficient in the sense that the raw score conveys all the information on the latent variable that the items as a whole can provide [10]. The patient raw score corresponds to the number of items rated as “crucial” or “very important”. The probability of the v 'th person rating the i 'th item as “crucial” or “very important” can be written as:

$$P(Y_{vi} = 1) = \frac{\exp(\theta_v - \alpha_i)}{1 + \exp(\theta_v - \alpha_i)}$$

θ_v describes how important the v 'th person in general finds aspects of health care and α_i is the item parameter which expresses how high priority the i 'th item has. The item parameters are often called item thresholds. The lower the threshold is the larger the

probability of a positive response. When the Rasch model does not provide a sufficient model of data, the graphical loglinear Rasch models (GLLRM) can be applied to identify and model the specific departures. The GLLRM permits uniform DIF and uniform local dependence (LD) [11–13] and defines a frame of inference for the analysis of exogenous covariates and the total raw score.

The models were estimated by the statistical software DIGRAM [14] with the recursive structure shown in Figure 1.

At first it was examined whether a Rasch model could fit data. A GLLRM was fitted afterwards. Fit of the models were tested by conditional likelihood ratio (CLR) tests. A critical level of 0.01 was applied.

The item parameters (threshold values) were estimated by conditional maximum likelihood methods [15]. When fitting, the GLLRM DIF and LD were analysed by CLR tests. DIF was tested in relation to all of the exogenous variables. Finally the association of the raw score and each of the exogenous variables (controlled for the effect of the other exogenous variables) were tested by chi-square-tests (χ^2) and partial gamma coefficients (γ) [16]. A critical level of 0.05 was used for all of the above mentioned tests. The Benjamini-Hochberg procedure for correcting false detection due to multiple testing was used [17]. For more technical details of the analyses, see publications by Kreiner and Christensen [11–13].

Results

Descriptive statistics

The models were estimated for the 1597 patients who had answered all the items included on the five-point scale. Table I provides a description of the 3676 patients who were invited to participate, the 2380 who answered the questionnaire, and the 1597 who were included in the analyses.

Table II shows the prioritised order of the items for the 1597 patients. Error rates and professional skills of health care professionals were given highest priority by the patients. In the middle of the priority list are the more peripheral services such as information, involvement, communication, and waiting times. Appearing at the lower end of the priority list were administrative services and physical environment.

Model selection

The Rasch model was clearly rejected due to DIF of several exogenous variables. A GLLRM was fitted instead and provided a much better fit to data (Table III). Three items were excluded from the

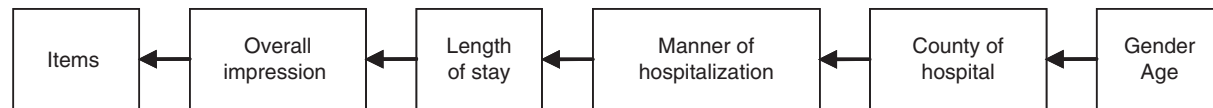
4 *M.G. Iversen et al.*

Figure 1. The recursive structure of the graphical loglinear Rasch model.

Table I. Characteristics of the total sample, the patients who responded, and the working sample.

Variable	%	Total sample (<i>n</i> = 3676)	Respondents (<i>n</i> = 2380)	Working sample (<i>n</i> = 1597)
Gender	Females	53.1	54.1	52.7
Age	<40 years	11.8	9.3	8.4
	40–49 years	12.0	12.1	12.4
	50–59 years	15.6	16.0	16.5
	60–69 years	24.1	27.7	29.2
	70–79 years	21.1	22.2	22.2
	>79 years	15.3	12.7	11.3
Employment	Employed	–	25.8	26.7
	Unemployed	–	3.5	3.6
	Retired	–	56.1	57.0
	Unknown	–	14.6	12.6
Highest education	Basic/secondary school	–	17.1	16.8
	Short-cycle education	–	7.4	8.4
	Vocational education/training	–	25.7	27.7
	Short-cycle higher education	–	4.0	3.8
	Medium-cycle higher education	–	14.0	14.2
	Long-cycle higher education	–	5.3	4.8
	Unknown	–	26.6	24.3
Manner of hospitalization	Acute	52.0	48.2	46.1
Length of stay	2 days	26.1	25.7	24.7
	3–4 days	25.8	26.6	26.1
	5–6 days	15.2	15.3	16.5
	7–13 days	22.9	23.4	24.0
	>13 days	10.1	9.1	8.6
County of hospital	Copenhagen	32.3	33.8	33.9
	Storstrøm	9.4	8.3	8.2
	Funen	26.8	26.4	27.4
	Ringkjøbing	8.7	9.2	8.1
	North Jutland	22.7	22.3	22.5
Overall impression of hospital stay	Very good	–	4.5	43.7
	Good	–	49.0	49.6
	Bad	–	5.1	5.7
	Very bad	–	1.2	1.1

GLLRM because of poor item discrimination. These items concerned short waiting time between referral and admission, and having one doctor and one nurse with special responsibility for care.

Items without differential item functioning

For 19 of the 36 items, the responses could be fully explained by how important the patients in general found aspects about their hospitalization since no DIF related to the exogenous variables are found (Table IV). These items were mainly among the top priorities and were especially related to errors,

professional skills of staff and some areas of communication and information.

The number of items patients had rated as “crucial” or “very important” was of all the exogenous variables only associated with gender (results not shown). In general the female patients found the aspects of hospital care to be more important than the male patients ($\gamma = 0.15$, $p < 0.001$) but the differences were marginal.

Items with differential item functioning

For the remaining 17 items DIF was found (Table IV). In particular, age appeared to have an

Table II. Share of the patients who rated the aspects as “crucial” or “very important” ($n = 1597$).

Item	%	CI 95%
No errors in connection with operation	98.3	(97.6–98.9)
Doctors are professionally skilled	98.2	(97.6–98.9)
No errors in medication	96.1	(95.2–97.1)
Information about operation results	94.1	(92.9–95.2)
Useful information if errors occur	92.2	(90.8–93.4)
Doctor is familiar with medical record	91.8	(90.5–93.2)
No errors in administration	91.5	(90.2–92.9)
Health care providers are professionally skilled	91.1	(89.7–92.5)
Consistency in information provided by different staff members	88.8	(87.2–90.4)
Useful information about medication at discharge	88.5	(86.9–90.1)
Information about future consequences of illness at discharge	88.0	(86.4–89.6)
One doctor with special responsibility for treatment	87.8	(86.1–89.4)
Information about adverse drug reactions	87.5	(85.9–89.2)
Information about possible complications in relation to operation	86.7	(85.0–88.4)
Useful information about post-treatment/rehabilitation at discharge	86.6	(84.9–88.2)
Treatment plans are observed	86.1	(84.4–87.8)
Information about operation results is delivered by the surgeon	85.4	(83.6–87.1)
Doctors are responsive	85.0	(83.3–86.8)
Information about treatment early on	84.5	(82.7–86.3)
Final conversation with doctor or nurse at discharge	83.6	(81.7–85.4)
Short waiting time between referral and admission	81.0	(79.0–82.9)
Ward is prepared for admission at arrival	80.9	(78.9–82.8)
Good communication between hospital wards	80.8	(78.9–82.8)
Information on whom to approach with questions after discharge	80.5	(78.5–82.5)
Conversation with doctor is possible when required	80.0	(78.0–82.0)
Involvement of patient in decisions of pain treatment	79.7	(77.8–81.7)
Information about expected pain after operation	78.7	(76.7–80.8)
No hospital on-site waiting time resulting in prolonged length of stay	74.4	(72.2–76.6)
Well-cleaned rooms	74.1	(71.9–76.2)
Health care providers are responsive	73.1	(70.9–75.3)
Written information about illness and treatment at admission	68.1	(65.8–70.4)
General practitioner is informed of operation result	67.1	(64.7–69.4)
Good physical surroundings	63.2	(60.8–65.6)
Time to consider offered surgery	60.6	(58.2–63.1)
Several doctors provide assessment of treatment (second opinion)	58.5	(56.1–61.0)
One nurse with special care responsibility	58.1	(55.6–60.5)
Involvement of relatives in decisions of treatment and care	51.3	(48.8–53.7)
Print of medical record	44.2	(41.7–46.7)
Good food	40.1	(37.6–42.5)

Table III. Tests of fit the ordinary Rasch model and the fitted GLRRM by conditional likelihood ratio tests.

Exogenous variables ^a	Rasch model			GLRRM		
	CLR	df	<i>p</i> -value	CLR	df	<i>p</i> -value
Gender	105.0	35	<0.001	82.6	64	0.059
Age	223.6	70	<0.001	102.2	74	0.017
Employment	233.5	105	<0.001	243.4	195	0.011
Manner of hospitalization	65.0	35	0.002	89.8	74	0.102

^aModel fit is only reported for the variables with DIF.

effect on the items which could not be explained by how important the patients in general perceived hospital care. The younger the patients, the higher the prioritization of meeting responsive health care providers and receiving information on operation

results, errors, medication, and future consequences of illness. On the other hand, age was positively correlated with the importance of having time to consider the surgery offered, information on operation results by the operating surgeon, consulting with a doctor at request, and having the general practitioner be informed of surgical outcome. In other words, age seemed to be negatively associated with the priority of information and positively associated with the priority of continuity. Well-cleaned rooms, good physical surroundings, and good food were considered of less importance by the middle aged group (60–69 years) compared to the other age groups. Avoidance of prolonged stay due to on-site waiting time had relatively high priority within the oldest age group (>69 years), whereas that same group did not prioritise the wards' preparation for their arrival in relative terms.

6 *M.G. Iversen et al.*Table IV. Item thresholds expressed in logits and presented separately for items with and without DIF^a.

		Threshold value				
<i>Items without DIF</i>						
No errors in connection with operation			-3.29			
Doctors are professionally skilled			-3.24			
No errors in medication			-2.13			
Doctor is familiar with medical record			-1.13			
No errors in administration			-1.04			
Health care providers are professionally skilled			-0.97			
Consistency in information provided by different staff members			-0.63			
Information about adverse drug reactions			-0.49			
Information about possible complications in relation to operation			-0.37			
Useful information about post-treatment/rehabilitation at discharge			-0.35			
Treatment plans are observed			-0.27			
Doctors are responsive			-0.17			
Information about treatment early on			-0.11			
Final conversation with doctor or nurse at discharge			-0.02			
Good communication between hospital wards			0.25			
Information on whom to approach with questions after discharge			0.28			
Involvement of patient in decisions of pain treatment			0.34			
Information about expected pain after operation			0.44			
Print of medical record			2.77			
<i>Items with DIF</i>						
			<60 years ^b	60-69years	>69 years ^b	
Information about operation results			-2.01	-1.70	-1.19	
Useful information if errors occur			-1.51	-1.13	-0.86	
Useful information about medication at discharge		Male	-0.72	- ^c	-	
		Female	-0.47	-	-	
Information about future consequences of illness at discharge		Male	-1.12	-0.82	-0.06	
		Female	-0.92	-0.62	0.14	
Information about operation results is delivered by the surgeon			0.03	-0.30	-0.44	
Ward is prepared for admission at arrival			0.05	0.00	0.65	
Conversation with doctor is possible when required			0.50	0.34	0.09	
No hospital on-site waiting times resulting in prolonged length of stay		Male	Employed	0.48	0.75	0.59
			Unempl.	1.48	1.76	1.60
			Retired	0.36	0.64	0.48
			Unknown	0.99	1.27	1.10
			Employed	0.84	1.12	0.95
		Female	Unempl.	1.85	2.12	1.96
			Retired	0.73	1.00	0.84
			Unknown	1.35	1.63	1.46
Well-cleaned rooms			0.50	1.16	0.88	
Health care providers are responsive		Male	0.95	1.19	1.45	
		Female	0.46	0.70	0.96	
Written information about illness and treatment at admission		Planned	0.89	-	-	
		Acute	1.64	-	-	
General practitioner is informed of operation result			1.54	1.16	1.11	
Good physical surroundings			1.57	1.89	1.30	
Time to consider offered surgery			2.01	1.75	1.49	
Several doctors provide assessment of treatment (second opinion)		Male	1.64	-	-	
		Female	2.08	-	-	
Involvement of relatives in decisions of treatment and care		Employed	2.73	-	-	
		Unempl.	2.50	-	-	
		Retired	2.01	-	-	
		Unknown	2.64	-	-	
Good food		Male	2.77	2.91	2.68	
		Female	3.34	3.49	3.26	

^aThe lower the value of the item threshold is the larger is the probability of a positive response. A positive response corresponds to a rating of the item as decisively or very important.^bThe youngest and oldest age groups are grouped in order to simplify the report of the results. The model selection is based on the more detailed categories reported in Table I.^cThe “-”-sign means that the item parameter value is the same as the value for the age group <60 years which means that no DIF in relation to age was found.

Information about medication and future consequences of illness provided at discharge, hospital's on-site waiting time, second opinions from doctors, and good food are considered by the male patients to be more important than by the female patients. The female patients found it more important than the male patients that the health care provider was responsive.

Patients with planned hospitalization considered it of higher importance than the acutely hospitalised patients to receive written information. Patients on pension found it more important to have their relatives involved in decisions than non-retired patients, while unemployed patients compared to employed and retired patients found it less important to avoid prolonged hospitalization due to waiting time.

It was only for a minor part of the biased items that DIF caused the sub-groups to have differences in the prioritised order of the items.

Local dependence (LD)

Some associations of LD between items related in content were detected (results not shown). These results have no relevance for the priorities of the patients.

Discussion

Correspondence of main results with existing literature

Largely, the analyses revealed that different groups of patients had the same qualitative priorities within hospital care. Consensus was mainly found within the highest prioritised aspects. The existing literature does not provide a clear picture of whether patients have the same priorities. In a review of patient priorities in primary health care Jung et al. [5] found that patient characteristics were associated with priorities in 27% of the reviewed associations.

Professional skills of health care professionals and absence of errors were rated to be the most important in the present study. Failing to succeed in these areas may have fatal consequences to the patients. In a review of the literature on patient priorities for general practice care, Wensing et al. [6] found aspects concerning accuracy and competence of the doctors to be the second highest rated. It should be noted though that comparisons between surveys of patient priorities can be problematic due to differences in cultures and health care systems between different countries as well as differences in which aspects of care the studies include.

The analyses revealed quantitative differences in the patients' priorities. In general, the women, to a higher degree than the men, found that the various aspects of their hospitalization were more important. This might suggest that women are more demanding than men when it comes to evaluating their stay at the hospital. If this interpretation is correct, this could mean that women express a higher degree of dissatisfaction than men in patient satisfaction surveys. Women were found to be less satisfied in the National Danish Survey of Patient Experiences [9] and in a recent study of hospitalised patients conducted by Thi et al. [18]. However no consistent relationship between gender and satisfaction has been found in preceding review studies [1,19]. The results of the present study do not support the general assumption that patients with a higher educational level are a more demanding patient group.

The analysis revealed some differences in how important different sub-groups found specific aspects. Due to multiple testing, one should keep in mind that some of the located differences may be false positive. Sub-group differences in the prioritised order of the aspects were in particular found in relation to age. In accordance with this finding, apart from religion and ethnicity, age was found to be the most significant cause of differences in patient priorities in the review by Jung et al. [5]. They found that younger patients placed greater emphasis on detailed information than older patients, while the latter group found continuity in care more important than the younger. These findings support the results from this study.

Methodological issues

It could be questioned whether the patients have been able to separate their actual experiences from their priorities when answering the questionnaire. If they have not been able to make this separation patients with bad experiences must be expected to give higher priority to the aspects of care because they find a need for quality improvement. However this does not seem to be the case since the exogenous variable about the patients overall evaluation of their hospital stay was not associated with how important the patients in general found aspects about their hospitalization. Consequently it does not seem likely that the previously mentioned result that women may be more demanding than men can be explained by women receiving care of lower quality.

Three items were excluded from the final model. The item regarding short waiting times between referral and admission was the first question in the

questionnaire which can be the reason for the bad function of the item. The two other items concerned having a doctor and a nurse with special responsibility for care. Maybe patients are not aware of how they can benefit from a person with special responsibility which could be the reason for the bad item functioning.

The authors find the questionnaire to be content valid with respect to covering the major aspects of a hospital stay for surgical patients. The included items cover the dimensions of health care suggested by Jung et al. [5] and Sofaer and Firminger [20]. Aspects of availability and accessibility are not paid much attention since access to hospital care is equal and free of charge for all citizens in Denmark. More specific wording of some of the questions might have led to more distinct differences in priorities among patients. Wordings like “useful information” can be interpreted very individually and broad terms like “physical surroundings” can be difficult to rate.

For the priorities of patients excluded from the analyses, a strong correlation with the priorities of those included in the analyses was found (Kendall's τ -b = 0.884).

Attrition in relation to participation in the survey was examined by binary logistic regression (results not shown). The level of significance was 0.05. The following groups were less likely to participate: the men, the youngest and oldest, acutely hospitalised patients, and patients hospitalised in North Jutland and Storstrøm County. The observed differences are not likely to have a noticeable impact on the results since gender was the only of the exogenous variables to be associated with the raw score ($p = 0.021$). Furthermore, item parameters are estimated in the conditional distribution of item responses given the total scores. Item parameter estimates therefore do not depend on a representative sample of the population [11]. However it is not possible to eliminate that the non-participating patients could have qualitative different priorities.

Concluding remarks

The study has contributed with knowledge about whether surgical patients differ in the way they prioritise aspects of hospital care. The overall conclusion is that to a great extent, surgical patients have the same priorities, but they differ in how important they find the aspects in general. In the study women in general found the aspects to be more important than the men. The qualitative differences were mainly related to age; younger patients placed more emphasis on information than older patients, and

older patients found continuity in care relatively more important than younger patients.

In the light of the results, care should be taken when comparing priorities within healthcare between groups of patients. Comparing the importance of single items may be misleading if the importance that the respondents in general ascribe to aspects of their healthcare is not taken into consideration. Furthermore the results indicate that it is important to adjust for gender in satisfaction surveys in order to obtain comparable results since female patients seem to be more demanding.

The results cannot be seen as an incentive to health care professionals to abstain from taking individual needs and wants into account since the conclusion only concerns surgical patients' overall priorities. There may be differences in patient priorities within more specific aspects of hospital care. The authors suggest that future research explores specific aspects of hospital care in depth. It could for instance be interesting to investigate the aspects of information further since age-related differences are found here.

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