Research paper

Are patients' preferences for shifting services from medical specialists to general practitioners related to the type of medical intervention?

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ABSTRACT

Background To improve the feasibility of shifting medical specialist to general practitioner (GP) services in patient-centred health care systems, it is important to know how this substitution is valued by patients. However, insight into patients' preferences is lacking.

Aim This study aims to fill this gap by assessing whether patients' preferences for substitution are related to the type of medical intervention.

Methods Questionnaires were sent to 1000 members of the Dutch Insurants Panel (potential patients). Panel members were asked about their preferences for and use of medical specialist and GP services regarding 11 medical interventions. Six hundred and ninety-four members (69%) responded. We used multilevel multinomial regression to analyse the data.

Results Preferences were significantly related to medical intervention type. GP services were preferred for follow-up treatments (e.g. removing stitches)

and non-complex invasive treatments (e.g. removal of lumps), and medical specialist services were preferred for complex invasive treatments (e.g. injection therapy for varicose veins), non-invasive treatments (e.g. start of insulin therapy) and diagnostic examinations (e.g. abdominal ultrasound). Age, effort required to visit a GP, perceived health status and previous treatment experiences also influenced preferences but did not confound the effects of medical intervention type.

Conclusion This study provides strong indications that patients' preferences for substitution are influenced by the type of medical intervention. Therefore it seems important that health policy makers, purchasers and practitioners take the preferences of (potential) patients into account.

Keywords: general practice, health service utilisation, multilevel analysis, patient preference, substitution

How this fits with quality in primary care

What do we know?
Substitution for medical specialist services by primary care is increasingly considered an instrument to improve quality and efficiency of care delivery. To effectively substitute medical specialist services in patient-centred health care systems it is important to take patient preferences into account alongside technical feasibility criteria, but insight into patients' preferences is lacking.

What does this paper add?
This study provides strong indications that patients' preferences for substitution are influenced by the type of medical intervention. According to patients, follow-up treatment and non-complex invasive treatment are more acceptable for substitution than complex invasive treatment, non-invasive treatment and diagnostic examinations.

Introduction

In the Netherlands and other countries with a strong primary care system, such as the UK and Scandinavian countries, general practitioners (GPs) provide first contact and ongoing care for most health care problems. They decide whether or not to refer patients to medical specialists in hospitals ('gatekeeper' function). This is regarded as cost-effective compared with health systems in which patients can access specialist services directly. To further improve the quality and efficiency of the health care system, health policies in many countries stimulate shifting medical specialist services delivered in hospitals to GPs.[1] Research suggests that this substitution offers cost benefits,[2–4] while quality of care and health outcomes seem to be unaffected if the transferred service does not demand competencies beyond those of the average GP.[1,5] Besides this, care by GPs is associated with improved access (proximity) and convenience for patients.[1,5]

To stimulate substitution, the Dutch government included several incentives for substitution in the reform of the Dutch health insurance system in 2006.[6] First, they introduced additional payments for specific services in primary care that substituted for medical specialist services.[6] Previous research has shown that additional payments for specific services in primary care indeed stimulate substitution.[7,8] Second, the Dutch government introduced a regulated market for health insurance, which emphasises cost-effective health care purchasing by insurers in order to attract patients.[6,9] For example, insurers can purchase care delivered by GPs instead of by medical specialists. To achieve this, they in turn have to spur on health care providers to provide high-quality health care which is produced as efficiently as possible. At the same time, insurers need to take into account their insurants' preferences for the source of health care delivery, since insurants have a free choice of insurer and can change insurer every year.[9] However, to date it is unclear how shifting medical specialist services to GPs is valued by patients.

Previous research that assessed patients' preferences for different provider types (e.g. medical specialist versus nurse practitioner) showed that patients base their provider choice mainly on providers' expertise,[10–13] and less on convenience[10] and the location of care.[13] The importance of waiting time for patients' preferences for provider type varies in different studies.[10,13] Furthermore, it was shown that patients' preferences for different provider types are influenced by age,[12] education[12] and previous experiences with the medical intervention.[12,14] Previous studies show slight differences between patients' preferences for health care provider types by type of medical intervention. For example, while surgical patients mainly base their provider choice on care delivery characteristics such as provider experience and specialisation,[13] chronically ill patients base their provider choice on the continuity of care.[15] Accordingly, we expect that patients' preferences for health care provider types, and thus for substitution, may be affected by medical intervention type (e.g. minor surgery, follow-up treatment and diagnostics). When this is true, health care policy makers, insurers and practitioners should take patients' preferences into account next to quality, efficiency and technical feasibility as criteria to effectively shift medical specialist services to GPs.

The aim of this study was to assess whether patients' preferences for service delivery by medical specialists or GPs were related to the type of medical intervention (e.g. diagnostics or minor surgery).

Methods

Data collection

We conducted an online survey among members of the Dutch Insurants Panel. The Insurants Panel consists of approximately 10,000 insurants of one of the biggest Dutch health insurers (market share = 26%).[16]

Compared with the Dutch population, older people (aged between 40 and 80 years), people with a bad to moderate self-reported health status and people who have been insured with the same health insurer for over 10 years are over-represented.[17] The aim of the panel is to gather information on people's experiences with and expectations of health care in general and their health insurer in particular. Members for the panel were recruited through an announcement in the health insurer's magazine. Compliance with privacy regulations was approved by the Dutch Data Protection Authority (number 1309664). According to Dutch legislation, neither obtaining informed consent nor approval by a medical ethics committee was obligatory for this study.

In February 2008, all panel members filled in a questionnaire on several background variables (age, gender and educational level). In June 2008, questionnaires were sent to 500 men and 500 women of the Insurants Panel who had agreed to complete Internet questionnaires. We used stratified random sampling to select these panel members and to create a subgroup that showed the same distribution regarding age as the whole Insurants Panel. After one week, a reminder was sent to 512 panel members who had not responded, and again after one week a second reminder was sent to 339 panel members.

Conceptual model

To assess the effect of medical intervention type on patients' preferences for type of health care provider, we constructed a conceptual model. In this model, the patients' preference for health care provider type is the dependent variable. The independent variable is represented by the medical intervention type. Andersen's Behavioural Model of Health Services Utilisation[18] was used to determine which covariates had to be included in our model to correct for confounding. Originally, the purpose of Andersen's framework was to discover inequities in health care utilisation,[18] but it has also been used to analyse choices of type of health care utilisation,[19] and choices for using conventional or complementary (alternative) medical services.[20] The framework portrays the process of choosing health care as a complex of three interrelated sets of predisposing (sociocultural characteristics of individuals), enabling (logistical aspects of obtaining care) and need factors.[21]

The survey included questions on all variables of our conceptual model:

- Preferences for health care provider type regarding 11 different medical interventions (Table 1). There were three options: (1) treatment by a GP, (2) treatment by a medical specialist and (3) no preference. According to the purchasing department of the insurer, these 11 medical interventions were eligible for substitution.
- Predisposing factors: age (continuous variable), gender and educational level (highest level of education was categorised into three levels, lower, intermediate and higher, according to the classification of Statistics Netherlands).

Table 1 Categorisation of medical interventions

Medical treatments	
Invasive I (complex)	Male sterilisation Injection therapy for varicose veins
Invasive II (non-complex)	Removal of small lumps Anti-inflammatory or pain-controlling injections into joints
Non-invasive	Guiding start of insulin treatment of diabetics (determine and (re)adjust type and amount of insulin) Guiding start of medicine for COPD (determine and (re)adjust type and amount of medicines)
Follow-up	Removal of stitches after hospital surgery Wound control after hospital surgery
Diagnostic examinations	
Diagnostic examinations	Abdominal ultrasound Electrocardiogram Examination of eyes with split lamp

- Enabling factors: travel distance—four-level categorical variable (< 5, 5–10, 10–20 or > 20 km, perceived effort needed to visit a GP or medical specialist—five-level categorical variable (none, little, intermediate, great or very great). Health insurance was not included as an enabling factor because the study population consists of insured patients of one health insurer, and all medical interventions included in this study were covered.
- Need factor: perceived health status—five-level categorical variable (poor, fair, good, very good or excellent)]. Perceived health status was used as a proxy for need because of its relation to use of health services.[16]

In addition, we included 'treatment experience'—use of health care services for one of the medical interventions in the past 12 months (dichotomous variable indicating whether or not a respondent had one of the medical interventions in the past 12 months)—as a covariate in our analysis, assuming that previous experiences could influence patients' preferences.

In addition, all panel members were asked why they preferred being treated or examined by a GP or medical specialist. The respondents could choose from 12 reasons. These reasons were similar for both health care providers.

The complete questionnaire used in this study is shown in Supplementary file 1.

Data analysis

We used descriptive statistics to describe the survey results. To analyse the effect of medical intervention type on preferences for health care provider type, we first categorised the medical interventions into five groups using dummy variables: complex invasive treatment (invasive I), non-complex invasive treatment (invasive II), follow-up treatment (follow-up), non-invasive treatment (non-invasive) and diagnostic examinations (Table 1). Categorisation was based on substantive considerations and a first analysis of the medical interventions. Next, we conducted multilevel multinomial regression analyses comparing three responses: (1) preference for GP, (2) preference for medical specialist and (3) no preference. The 'GP preference' was regarded as a reference group. In the multilevel analyses, two levels were distinguished: 11 medical interventions (level 1) within individual respondents (level 2). By analysing the data with multilevel models, we took into account this hierarchical data structure; the preferences of a given individual for each of the medical interventions are supposed to be correlated.[22,23]

Two models were tested using MLwiN 2.0 (see Supplementary file 2, available online only, for model specifications). In the first model, the influence of the type of medical intervention on preferences for health care provider type was assessed. In the second model, the covariates were added to the model to correct for confounding. The level 2 variance and the covariance between the dependent variables were inspected.

Results

The questionnaire was returned by 694 members of the Insurants Panel (response rate 69.4%). All 694 respondents filled in all questions about their preferences for health care provider type regarding the 11 medical interventions. Respondents were similar to non-respondents in terms of age, gender and educational level (Table 2).

Table 3 shows the unadjusted preferences for health care provider type. For complex invasive treatments, non-invasive treatment and diagnostic examinations, respondents more often preferred treatment or examination by a medical specialist than by a GP. Respondents more often preferred to visit a GP for follow-up treatment and non-complex invasive treatments.

Table 4 shows the five most common reasons to prefer utilisation of GP or medical specialist services. GP services were preferred because of better accessibility (52% of respondents), shorter access times (50%) and more comfort (28%) in comparison with medical specialist services. Reasons for preferences for medical specialist services included better skills of a medical specialist (82% of respondents), a lower perceived risk of treatment by a medical specialist (43%) and more confidence in medical specialists (31%) compared with GP services.

The results of the multilevel multinomial regression analysis are presented in Table 5.

The preference for health care provider type was significantly related to medical intervention type. The regression coefficients confirm the pattern in Table 3. In order of preference for GP services compared with GP preference in cases of complex invasive treatment, medical specialist services are preferred slightly less often for the examples of diagnostic examination (Model I: $\beta = -0.45$, $p < 0.01$; Model II: $\beta = -0.48$, $p < 0.01$), less so for the examples of non-invasive treatment (Model I: $\beta = -1.49$, $p < 0.01$; Model II: $\beta = -1.51$, $p < 0.01$), even less so for the examples of less complex invasive care (Model I: $\beta = -2.98$, $p < 0.01$; Model II: $\beta = -3.01$, $p < 0.01$), and least for follow-up care (Model I: $\beta = -3.11$, $p < 0.01$; Model II: $\beta = -3.17$, $p < 0.01$). The preference for GP services compared with no preference shows the same pattern.

Comparison of model 1 and model 2 showed that covariates did not confound the effect of type of medical intervention on respondents' preferences.

Table 2 Characteristics of study population

	Response ($n = 694$)	Non-response ($n = 306$)
Predisposing factors		
Age		
Mean (SD)	56.8 (11.9)	53.9 (13.9)
Range	21–82	21–83
Gender		
Male (%)	49	53
Female (%)	51	47
Education		
Lower (%)	14	18
Intermediate (%)	45	43
Higher (%)	41	38
Enabling factors		
Travel: distance to GP		
< 5 km (%)	87	
5–10 km (%)	10	
10.1–20 km (%)	2	
> 20 km (%)	1	
Travel: distance to hospital		
< 5 km (%)	33	
5–10 km (%)	32	
10.1–20 km (%)	26	
> 20 km (%)	9	
Perceived effort to visit GP		
None (%)	51	
Little (%)	38	
Intermediate (%)	9	
Great (%)	2	
Very great (%)	n0	
Perceived effort to visit hospital		
None (%)	21	
Little (%)	45	
Intermediate (%)	28	
Great (%)	5	
Very great (%)	1	
Need factor		
Perceived health status		
Bad (%)	1	
Poor (%)	14	
Good (%)	56	
Very good (%)	20	
Excellent (%)	9	
Treatment experience		
No (%)	59	
Yes (%)	41	

Table 3 Unadjusted preferences for GP and medical specialist services by medical intervention type ($n = 694$)

Preferences[1]	GP	Medical specialist	No preference
Invasive I % (n)	5 (71)	74 (1027)	21 (290)
Invasive II % (n)	50 (687)	27 (381)	23 (320)
Follow-up % (n)	55 (767)	27 (373)	18 (248)
Non-invasive % (n)	24 (339)	56 (770)	20 (279)
Diagnostics % (n)	11 (237)	71 (1476)	18 (369)

[1] Each insurant had to fill in his or her preference for a health care provider for 11 different medical interventions. This means that each of the five categories includes 2 or 3 × 694 preferences.

Table 4 Five most commonly mentioned reasons to prefer utilisation of GP or medical specialist services

Reasons for choosing GP services ($n = 667$)	% (n)
I think I can reach the GP more easily than a medical specialist	52 (348)
I think the time till examination/treatment is shorter with the GP than with a medical specialist	50 (336)
I usually feel more comfortable with the GP than with a medical specialist	28 (185)
I think I can reach the GP more easily when complications occur after treatment than I can reach a medical specialist	27 (180)
I think the burden of an examination/treatment with the GP is less than with a medical specialist	26 (175)

Reasons for choosing medical specialist services ($n = 690$)	% (n)
I think the medical specialist is more skilful than a GP	82 (563)
I think that an examination/treatment by a medical specialist is less risky than one by a GP	43 (298)
I have more confidence in the medical specialist than in a GP	31 (214)
I think I can reach the medical specialist more easily when complications occur after treatment than I can reach a GP	25 (175)
I think a medical specialist will explain an examination/treatment better than a GP	17 (115)

Instead, they provided additional information about the respondents' preferences. It appeared that older respondents ($\beta = 0.01$, $p = 0.02$), respondents for whom the effort to visit a GP is relatively great ($\beta = 0.26$, $p < 0.01$) and respondents with treatment experience ($\beta = 0.47$, $p < 0.01$) more often preferred medical specialist services. Respondents with a better perceived health status ($\beta = -0.13$, $p = 0.04$) preferred GP services more frequently.

The bottom rows of Table 5 show the variance in the responses at the level of the respondents and the covariance between the responses. Multilevel analysis allowed us to analyse variance and covariance. In a traditional analysis we would have analysed the responses for each of the 11 interventions separately.

Table 5 Preferences for health services use: regression coefficients and standard errors, and variance and covariance of the multilevel multinomial regression analysis ($n = 694$)

	Model I[1]				Model II[1]			
	Medical specialist		No preference		Medical specialist		No preference	
	Intercept - β (p)	SE	Intercept - β (p)	SE	Intercept - β (p)	SE	Intercept - β (p)	SE
Medical specialist	0.94 (< 0.01)	0.05	–	–	0.90 (< 0.01)	0.05	–	–
No preference	–	–	–0.34 (< 0.01)	0.08	–	–	–0.35 (< 0.01)	0.08
Medical intervention type								
Invasive I	–	–	–	–	–	–	–	–
Invasive II	–2.98 (< 0.01)	0.09	–1.78 (< 0.01)	0.10	–3.01 (< 0.01)	0.09	–1.75 (< 0.01)	0.10
Follow-up	–3.14 (< 0.01)	0.09	–2.27 (< 0.01)	0.11	–3.17 (< 0.01)	0.09	–2.22 (< 0.01)	0.11
Non-invasive	–1.49 (< 0.01)	0.09	–1.11 (< 0.01)	0.10	–1.51 (< 0.01)	0.09	–1.10 (< 0.01)	0.10
Diagnostic examination	–0.46 (< 0.01)	0.09	–0.50 (< 0.01)	0.09	–0.48 (< 0.01)	0.09	–0.47 (< 0.01)	0.09
Predisposing factors								
Age	–	–	–	–	0.01 (0.02)	0.00	0.00 (0.39)	0.01
Gender								
Male	–	–	–	–	–	–	–	–
Female	–	–	–	–	–0.09 (0.26)	0.09	–0.16 (0.23)	0.16
Education	–	–	–	–	–0.01 (0.39)	0.07	–0.20 (0.08)	0.11
Enabling factors								
Travel distance to GP	–	–	–	–	–0.16 (0.08)	0.09	–0.24 (0.12)	0.16
Travel distance to hospital	–	–	–	–	0.06 (0.18)	0.05	–0.24 (0.01)	0.09
Perceived effort to visit GP	–	–	–	–	0.26 (< 0.01)	0.07	0.17 (0.15)	0.12
Perceived effort to visit hospital	–	–	–	–	–0.03 (0.31)	0.06	0.08 (0.29)	0.10
Need								
Perceived health status	–	–	–	–	–0.13 (0.04)	0.06	–0.19 (0.07)	0.10

Table 5 Continued

	Model I[1]				Model II[1]			
	Medical specialist		No preference		Medical specialist		No preference	
	Intercept - β (p)	SE	Intercept - β (p)	SE	Intercept - β (p)	SE	Intercept - β (p)	SE
Treatment experience								
No	–	–	–	–	–	–	–	–
Yes	–	–	–	–	0.47 (< 0.01)	0.14	–0.45 (< 0.01)	0.16
Level 2 variance and covariance								
Variance	0.99 (< 0.01)	0.08	3.07 (< 0.01)	0.22	0.88 (< 0.01)	0.07	2.85 (< 0.01)	0.21
Covariance	0.96 (< 0.01)	0.10			0.80 (< 0.01)	0.09		

[1] The multilevel multinomial regression analyses compared three groups (GP, medical specialist and no preference). The GP group and treatment group invasive I are in all models regarded as reference group. The results of each model are presented in two columns (medical specialist and no preference) compared with the preference for a GP and in case of treatment invasive I.

This is inefficient and does not take into account that a respondent's preference in the case of one of the interventions might be related to their preference in the case of the other interventions. This relationship between preferences, elicited for the 11 different interventions, is expressed by the variance at the level of the respondents (level 2 variance in Table 5). The variance between respondents who have no preference is much higher ($\chi^2 = 2.84$, $p < 0.01$) than that between respondents who prefer medical specialist services ($\chi^2 = 0.88$, $p < 0.01$). This means that that stating no preference is more of a general pattern of reacting to the questions about their preferences rather than being influenced by the specific medical interventions. Conversely, the specific preferences for either GPs or medical specialists depended more on the specific medical interventions. The use of multinomial multilevel analysis allowed us to analyse the three options for preferences, no preference, preference for GP or preference for medical specialist, simultaneously. Again, this is a more efficient analysis and it takes into account the fact that these preferences might be mutually related. This is expressed by the covariance. The covariance shows that respondents who more frequently prefer medical specialist services also frequently have no preference rather than preference for a GP.

Discussion

This study provides strong indications that patients' preferences for substitution are influenced by medical intervention type. Additional findings suggest that patients' age, the effort needed to visit a GP, perceived health status and previous treatment experiences also influence preferences for substitution but do not confound the effects of medical intervention type on patients' preferences. These additional findings are in line with previous studies[12] and utilisation patterns of health services. Rodriguez *et al*[24] found, for example, that having fair or poor health increases the chance of visiting a medical specialist, and that longer travel times to hospitals (i.e. a greater effort) had a significant negative effect on the probability of seeing a medical specialist. Being older increases the chance of having fair or poor health due to having an increased chance of (multiple) illness. This is probably not completely captured by self-rated health. Therefore it seems plausible that older people more often prefer treatment by a medical specialist.

Our study has some limitations. First, due to the limited number of treatment examples per medical intervention type, the results cannot be generalised to all treatments. Second, the medical interventions included in this survey were not all applicable to male and female respondents (e.g. male sterilisations). However, the statistical model adjusted for gender. Although these limitations prevent us from applying our results to every type of diagnostic examination, com-

plex invasive, non-complex invasive, non-invasive and follow-up treatment, our study does give clear indications that patients do not always prefer substitution. A third limitation of our study is that, compared with the Dutch population overall, older people (aged 40–80 years) and people with a bad to moderate self-reported health status were over-represented in the panel used. However, these groups use health care services more frequently, which makes their preferences more relevant. We therefore do not think that the overrepresentation of these groups has led to distortions in the results, and it does not influence the relevance of the results. Another limitation is that we performed our study among a sample of panel members instead of patients. These panel members are not typical of all patients. This may have led to selection bias.

Our study is, to our knowledge, the first to quantitatively investigate patients' preferences for health care providers regarding several types of medical interventions. Previous studies have focused on patients' preferences for one type of medical intervention (e.g. follow-up care for breast cancer patients[12]) or for one patient group (e.g. dermatology services[10]). Despite the limitations, our study provides useful findings for health care policies aiming to shift services from medical specialists to GPs in patient-centred health care systems. The results of this study show health policy makers, purchasers and practitioners strong indications that shifting follow-up treatment and non-complex invasive treatment from medical specialists to GPs has the largest support among (potential) patients. However, health care policy makers, purchasers and practitioners have to be aware that patients may be resistant to changes in the organisation of health care. Patients tend to prefer what they know best or have experienced previously.[12,25] However, acceptance by the public is not enough to effectively implement substitution of care. To ensure that patients get the opportunity to act according to their preferences, they must be adequately informed and the health care system must allow it. Patients have to learn, in turn, to express their preferences and act as autonomous health care users. Furthermore, health care policy makers and purchasers have to be aware of the risk that the quality of services may change when medical specialist services are substituted with primary care services. A change in quality could go either way, improving or decreasing quality. A risk to quality is, for example, that GPs will not be sufficiently skilled to undertake the work previously done by medical specialists.[1] It is therefore important to first assess whether GPs are equipped and skilled to provide these treatments, or otherwise start educational interventions to address this before shifting services. Another concern in the literature is that transfer will lead to increases in total health care expenditure at a macro level.[26] Although previous research showed that reductions in costs were achieved through lower salaries or reimbursements in primary care[2–4] and reduced time and travel costs for patients,[1,5] these can be offset by rises in costs generated through increases in the volume of care and loss of economies of scale.[1] More important probably is that the capacity that is freed in medical specialist care by shifting services to primary care might be quickly filled by higher demand for other services. The extent to which this happens depends on the incentives in the system. Specifically, for the interventions that were used as examples in our survey there is—as far as we know—no literature about improved quality when comparing medical specialists and GPs. In general, research about disease management[27] and bundled payments for the treatment of chronic disease[28,29] shows some evidence of improved care. However, this is related to programmes, rather than separate interventions, and the evidence is still not very strong.

Therefore, first of all, medical specialist services that can be substituted by GPs should be chosen carefully. Second, purchasing should be part of an integral policy that focuses on broader care programmes into which separate interventions fit, and that as far as possible takes cross-over effects of substitution into account.

Conclusion

This study demonstrated that patients' preferences for substitution are influenced by medical intervention type. These findings provide strong indications that health policy makers, purchasers and practitioners in patient-centred health care systems should take patients' preferences into account next to quality, efficiency and technical feasibility as criteria for effectively substituting medical specialist services with GP services.

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Supplementary files

Supplementary file 1: Questionnaire

Note: This questionnaire was originally written in Dutch and was only translated for this publication.

Survey questions: 'Preferences for type of health care provider'

1 What is your date of birth (dd/mm/yyyy)?
☐-☐-☐

2 What is your gender?
☐ Male
☐ Female

3 What is your highest level of completed education?
☐ No education
☐ Primary school
☐ Lower secondary or vocational school
☐ Intermediate secondary or vocational school
☐ Higher secondary or vocational school
☐ Bachelor
☐ Master

4 In general, would you say your health is:
☐ Poor
☐ Fair
☐ Good
☐ Very good
☐ Excellent

5 What is the distance between your house and your GP?
☐ < 5 km
☐ 5–10 km
☐ 10–20 km
☐ > 2 km

6 What is the distance between your house and your preferred hospital?
☐ < 5 km
☐ 5–10 km
☐ 10–20 km
☐ > 20 km

7 How much effort does it require to visit your GP?
☐ None
☐ Little
☐ Intermediate
☐ Great
☐ Very great

8 How much effort does it require to visit your preferred hospital?
☐ None
☐ Little
☐ Intermediate
☐ Great
☐ Very great

9 Mark the diagnostic examinations and treatments that you have received in the past 12 months.

If you did not receive any of these diagnostic examinations or treatments in the past 12 months, then mark the last option.

☐ Male sterilisation
☐ Injection therapy for varicose veins
☐ Removal of small lumps
☐ Anti-inflammatory or pain-controlling injections into joints
☐ Guiding start of insulin treatment of diabetics ((re)adjustment of type and amount of insulin)
☐ Guiding start of medicines for COPD ((re)adjustment of type and amount of insulin)
☐ Removal of stitches after hospital surgery
☐ Wound control after hospital surgery
☐ Abdominal ultrasound
☐ ECG
☐ Examination of eyes with split lamp
☐ I did not receive any of the above-mentioned diagnostic examinations or treatments in the past 12 months

Assume that you need the following diagnostic examinations and treatments. By whom would you prefer to be treated: your GP, a medical specialist, or do you have no preference? Mark your preference for each diagnostic examination or treatment.

	GP	Medical specialist	No preference
Male sterilisation	☐	☐	☐
Injection therapy for varicose veins	☐	☐	☐
Removal of small lumps	☐	☐	☐
Anti-inflammatory or pain-controlling injections into joints	☐	☐	☐
Guiding start of insulin treatment of diabetics [(re)adjustment of type and amount of insulin]	☐	☐	☐
Guiding start of medicines for COPD [(re)adjustment of type and amount of insulin]	☐	☐	☐
Removal of stitches after hospital surgery	☐	☐	☐
Wound control after hospital surgery	☐	☐	☐
Abdominal ultrasound	☐	☐	☐
ECG	☐	☐	☐
Examination of eyes with split lamp	☐	☐	☐

Why would you choose your GP for one or more diagnostic examinations and/ or treatments? Mark a maximum of three reasons.

☐ I think that the GP will explain an examination or treatment better than a medical specialist
☐ I usually feel more comfortable with the GP than a medical specialist
☐ I think the GP is more skilful than a medical specialist
☐ I think the burden of an examination or treatment with the GP is less than that with a medical specialist
☐ I have more confidence in the GP than in a medical specialist
☐ I can ask the GP questions more easily than I can ask a medical specialist
☐ I think I can reach the GP more easily than I can reach a medical specialist
☐ I think the time until an examination or treatment is shorter with the GP than with a medical specialist
☐ I think that an examination or treatment is less costly with the GP than with a medical specialist
☐ I think that an examination or treatment by a GP is less risky than that by a medical specialist
☐ I think I can reach the GP more easily when complications occur after treatment than I can reach a medical specialist

Why would you choose a medical specialist for one or more diagnostic examinations and/or treatments? Mark a maximum of three reasons.

☐ I think that the medical specialist will explain an examination or treatment better than a GP
☐ I usually feel more comfortable with the medical specialist than with a GP
☐ I think the medical specialist is more skilful than a GP
☐ I think the burden of an examination or treatment with the medical specialist is less than that with a GP
☐ I have more confidence in the medical specialist than I have in a GP
☐ I can ask the medical specialist questions more easily than I can ask a GP
☐ I think I can reach the medical specialist more easily than I can reach a GP
☐ I think the time till an examination or treatment is shorter with the medical specialist than with a GP
☐ I think that an examination or treatment is less costly with the medical specialist than with a GP
☐ I think that an examination or treatment by a medical specialist is less risky than that by a GP
☐ I think I can reach the medical specialist more easily when complications occur after treatment than I can reach a GP

Supplementary file 2: The multilevel multinomial model

$$y_{ij} \sim \text{Multinomial}(cons, \pi_{ij})$$

$$\log(\pi_{1j}/\pi_{3j}) = \beta_0 cons.medpref + \beta_2 x_{2j} + \beta_3 x_{3j} + \beta_4 x_{4j} + \beta_5 x_{5j} +$$
$$\beta_6 x_{6j} + \beta_7 x_{7j} + \beta_8 x_{8j} + \beta_9 x_{9j} + \beta_{10} x_{10j} + \beta_{11} x_{11ij} + \beta_{12} x_{12ij} + \beta_{13} x_{13ij} + \beta_{14} x_{14ij} + e$$

$$\beta_{0j} = \beta_0 + v_{0j}$$

$$\log(\pi_{2j}/\pi_{3j}) = \beta_1 cons.npref + \beta_2 x_{2j} + \beta_3 x_{3j} + \beta_4 x_{4j} + \beta_5 x_{5j} +$$
$$\beta_6 x_{6j} + \beta_7 x_{7j} + \beta_8 x_{8j} + \beta_9 x_{9j} + \beta_{10} x_{10j} + \beta_{11} x_{11ij} + \beta_{12} x_{12ij} + \beta_{13} x_{13ij} + \beta_{14} x_{14ij} + e$$

$$\beta_{1j} = \beta_1 + v_{1j}$$

$$\begin{bmatrix} v_{0j} \\ v_{1j} \end{bmatrix} \sim N(0, \Omega_v) : \Omega_v = \begin{bmatrix} \sigma^2_{v0} & \\ \sigma_{v1\,0} & \sigma^2_{v1} \end{bmatrix}$$

$$e = 1 \,(\text{Multinomial, constrained})$$

PQL, second order

y_{ij} = dependent variable (preference for medical specialist, or no preference, dichotomous)
i = treatments
j = insurants

β_0 = mean propotion of insurants with a preference for medical specialist
β_1 = mean proportion of insurants with no preference
x_2 = age
x_3 = gender (female)
x_4 = education
x_5 = travel distance to GP
x_6 = travel distance to hospital
x_7 = perceived effort GP
x_8 = perceived effort hospital
x_9 = perceived health status
x_{10} = treatment experience (yes)
x_{11} = invasive II
x_{12} = follow - up
x_{13} = non - invasive
x_{14} = diagnostic examination

v = level - two variance (insurants level)
e = measurement error