Patient preferences for hospital quality in Bandar Abbas using a Discrete Choice Experiment: 2010-2011

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Abstract: This study reports on the results of a discrete choice experiment undertaken in Bandar Abbas general hospitals to assess the factors influencing the demand of hospital care. In particular, the role of quality and trade-offs between attributes. It then presents a case study applying the technique to patients refferd to general hospitals in Bandar Abbas. 326 patients were questioned about the importance of five attributes with 16 hypothetical scenarios made that describe the quality of services in hospitals with 2 and 3 levels for each attribute. For each scenario, subjects chose between the hypothetical hospital; hospital A or B. A random effect probit model was used to estimate quantity of subject preferences for hospital quality and marginal rate of substitution between attributes. Marginal utility for attributes of quality of hospitals were estimated. We find that receiving services in a hospital that have discharge training paln represented by thoroughness of examination to be the most important quality attribute, followed by having high nursing care at wards and doctors giving enough information about the illness, drugs and treatment to the patient.
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1. Introduction

In various ways health economists are engaged in eliciting persons' stated preferences with a view to using this information to inform resource allocation decisions in health care. One elicitation method that is increasingly being used is the discrete choice experiment (DCE).(Stirling, 2004)

Discrete choice experiments (DCEs) are an attribute-based stated preference valuation technique. DCEs are an attribute-based stated preference valuation technique. (Anthony, 2003). DCEs are an attribute based measure of benefit that is based on the assumptions that firstly, healthcare interventions, services, or policies can be described by their characteristics (or attributes) and secondly, an individual's valuation depends on the levels of these characteristics.

DCEs were introduced into health economics as a technique to go beyond the quality adjusted life year (QALY) paradigm. Users were concerned with many aspects of health care beyond health outcomes. Such factors included waiting time, location of treatment, type of care (for example, surgical or medical), and staff providing care (consultant or specialist nurse) and were referred to as process attributes. DCEs allow investigation of the trade-offs between such process and health outcomes attributes. Applications of discrete choice experiments have been extended to consider provider preferences such as strength of hospital consultants' preferences for various aspects of their work. More recently the technique has been used to value health outcomes in the provision of care (often beyond those valued within the QALY). (Mandy, 2004)

DCEs are increasingly being used to investigate preferences for healthcare products and programs and for the attributes that make up these products and programs (Ryan et al., 2001a). DCE is a stated preference method, in which respondents are requested to express preferences for sets of hypothetical choice alternatives constructed according to experimental design principles. Ryan et al. (2001b) systematically reviewed the application of DCE in health care and concluded that DCE performs well. (VAN HELVOORT-POSTULART, 2008).

The aim of this study is to understand the factors affecting the demand for hospital services in general hospitals in Bandar Abbas, Iran. The discrete choice form of stated preferences study seems most appropriate because it is relatively simple and best mimics the type of choice that individuals make in the hospital care market.

Hospitals are encouraged to augment their revenue base by generating revenue from paying patients. This implies that they are competing for patients, which should make them more responsive to patient preferences.

2. Materials & Methods

The theoretical base of discrete choice experiment are rooted in Random Utility theory. In choosing which medical center to refer, individuals face a number of options, each of which yields indirect utility, Y*. Y* is latent variable which is not directly observed. All we observe is whether an option is chosen or not. Individuals are assumed to choose the option that yields the highest indirect utility.

$Y^*_i = \text{Max}\ (Y^*_1, Y^*_2, Y^*_3, \ldots, Y^*_m)$

The indirect utility yielded by an option is assumed to be a function of choice-specific attributes. The residual ε captures unobserved variation in the characteristics of the different option and errors in measurement and optimization by the consumer.[5]

In other words:

$Y_{iq=} X_i B_i + \varepsilon_{iq}$

Where Y_{iq} is the indirect utility of individual q for option I and X_i is a vector of attributes of the ith choice.

Making the specific assumption about the distribution of the error term, the choice can be modeled using a logit or probit model. Because each individual is asked to make multiple choices the error term can not be assumed to be independent and panel data estimation techniques are required.

$\Delta Y=\beta_0+ \beta_1 (X_{1i}-X_{1j})+ \beta_2(X_{2i}-X_{2j})+ \ldots (\varepsilon_i- \varepsilon_{j(}$

The estimated parameters can be interpreted as the marginal utility from a change in the level of the attribute as one moves from option 1 to option 2. The ratio of any two parameters is the marginal rate of substitution between them.

Study was undertaken in 4 general hospitals of Bandar Abbas city, Iran.

Establishing attributes and levels:

Dimensions of hospital quality was obtained from focus group discussions and literature review. Separate discussion were held with hospital managers about the most important attributes. Discussion was conducted by a master of health economics.

Following the analysis of the focus group discussion and reviewing literatures, five hospital quality attributes were chosen to be included in questionnaire (Table1).

The level of attributes were chosen to reflect the range of situation that respondents might expect to experience.

Table 1: Attributes and levels

Attribute	Variable name	level
discharge training paln	DISCHARGE	Yes=1 No=2
nursing care at wards	NURSING	Good=2 Moderate=1 Poor=0
Likelihood that physician provide patient with information about the illness, drugs and treatment	PHYSICIAN	Good=2 Moderate=1 Poor=0
Cleanliness of wards and toilets	CLEAN	Often clean=1 Rarely clean=0
Waiting time between arrival at hospital and admission to the ward	WAIT	1hour= 2 3 hours= 1 5 hours= 0

The five attributes and levels in table 1 give rise to a total of 108 scenarios (3^2, 2^2). A fractional factorial design was used to reduce this number of scenarios to a feasible number. SPSS v. 19 software was used to generate an orthogonal main effects design which product a total of 16 scenarios. One of these 16 scenarios was randomly chosen as the constant comparator which gave a total of 15 choice pairs for each questionnaire. A sample pair of scenario is shown below:

Sample scenario:

Attributes	Hospital A	Hospital B
Information given by physician about illness	moderate	moderate
Discharge training	no	yes
Nursing care	good	moderate
Cleanliness of wards and toilets	Often clean	Often clean
Waiting time	3 hours	1 hours
Which hospital do you choose?	Hospital A □	Hospital B□

Although the use of design software to generate the scenarios was aimed at producing an orthogonal factorial design, orthogonality is no longer guaranteed once scenarios are paired.[5]

Orthogonality in attribute differences was therefore verified by using $\varkappa^2$ tests of association. Because the focus group did not directly investigate the relative importance of different attributes, it is noy possible to comment on whether the design meets the criterion of utility balance.

Data analysis:

The data were analysed using the random effect probit estimator in STATA v.6.

The codes of variables for analysis is shown in table 1. The baseline model is:

$\Delta Y = \alpha_1(\text{d-DISCHARGE}) + \alpha_2(\text{d-NURSING}) + \alpha_3(\text{d-pHYSICIAN}) + \alpha_4(\text{d-CLEAN}) + \alpha_5(\text{d-WAIT}) + \varepsilon + \mu$

Where corr $(\varepsilon,\mu) = \rho$, which take account of the correlation among an individual choice and

d-DISCHARGE = difference in having discharge training or not between options 1 and 2

d-NURSING = difference nursing care at wards between options 1 and 2

d-PHYSICIAN = difference in thoroughness of giving information about illness, drugs, … between options 1 and 2

d-CLEAN = difference in cleanliness between options 1 and 2

d-WAIT = difference in waiting time between options 1 and 2.

Theoretical validity of the valuation was assessed by determining whether the estimated quality parameters were of the anticipated sign. The sign of the different variables depends on the sign of the value taken by the constant comparator, so affecting the expected sign of the coefficient. Giving enough information about illness, good nursing care, having discharge training, less waiting time and often cleaned wards and toilets, were all expected to increase utility.

To investigate the internal consistency of responses, two choice pair was included in which one option was superior to the other in all attributes, assuming that people prefer a hospital which gives enough information about illness, have good nursing care, have discharge training, less waiting time and often cleaned wards and toilets, to exclude individuals who failed to choose the superior option or were unable to give consistent answer because of problems of misunderstanding.

3. Results:

From the target number of 330 questionnaires, 326 was achieved. In which 122 were male and 204 were female and 219 individuals stated that they have higher education equals at least to bachelor degree. This shows that understanding the questionnaires was hard to others. The interviewer also mentioned that higher educated individuals were easier to describe scenarios for them.

Table 2 presents the result from the random effects model. the statistical significance of rho confirms the appropriateness of using the panel data estimator. The estimated coefficients are all of the anticipated sign and are statistically significant. The coefficient can be interpreted as the effect of the difference between option one and option 2 on the likelihood of choosing option 1 over option 2, which the sign reflects if the level of the attributes was higher or lower in option 1.

The coefficient of waiting time is of opposite sign as anticipated reflecting a higher probability of choosing less waiting time hospital, this implies greater disutility associated with longer waiting time. The coefficient on cleanliness and waiting time were not statistically significant.

4. Discussion:

The results presented above provide new information about how consumers value the quality of hospital care. We find that discharge training is the most important quality attribute as presented by the thoroughness of examination preferences for hospital quality for studied communication are:

1- Discharge training
2- Nursing care at wards
3- Giving information about the illness by physicians
4- Cleanliness of wards and toilets
5- Waiting time

A study of patient preferences for hospital care in Zambia found the technical quality of care to be the most important quality attribute, then friendly

staff and drug availability (Maddala, 1983). Also a study of consumer preferences for hospital care in Australia found the complication rate, together with waiting times to be the most highly attributes. (Jan, 2000)

There are a number of methodological weaknesses that we would try to remedy in future studies.

First, it appears that our sampling strategy was biased toward higher educated people. This can be seen from the higher number of educated respondents.

Second, we did not include a choose neither option and consequently have effectively estimated an unconditional demand curve. (Ryan, 2005)

Third, we used a very limited form of test for dominant preferences, which may not be sufficiently powerful to detect this violation of the standard axioms. In addition to using the criterion of whether an individual always choose the superior scenarios in one attribute, it would have been useful to incorporate additional information about the relative importance of the different attributes.(Scott, 2001)

The choice of the quality attributes to include in the questionnaire and their interpretation by respondents also raises important issue for study design and interpretation of results. We choose attributes that encompasses a broad range of the quality dimensions that were identified in the focus group discussion. However this may complicate the interpretation of the coefficients which may reflect a broader construct in the mind of the respondent.

In sum, we have shown that it is feasible to undertake DCE studies and that the result can be used to inform health financing policy. Our findings suggest that policy makers will have difficulties in reconciling the demand of an equitable financing strategy with those of greater market orientation.

The characteristics of demand for hospital services may encourage hospitals to segment demand by improving quality of care.

Table 2: random effects probit model

Attribute	coefficient	Marginal effect	Z	p>|z|	95%conf.Interval
Information given by physician about illness	.4607367	0.46	4.14	0.000	.6789633 .2425102
Discharge training	1.206117	1.21	6.50	0.000	.8425976 1.569637
Cleanliness of wards and toilets	.2525942	0.25	1.28	0.201	-.1348152 .6400037
Waiting time	-.1802739	-0.18	-1.55	0.122	-.0481158 .4086636
Nursing care	.6890385	0.69	5.71	0.000	.4525837 .9254934
consistent	-.5705899	-0.57	-1.99	0.046	-1.131674 -.009506
Observations=4890 **individuals= 326** **No. of scenarios= 15** **log-likelihood= -237** **chibar2= 0.00** **wald chi2= 97.39** **prob>= chibar2= 0.00**					

Conclusions

This paper has considered the role of DCEs when eliciting preferences in the delivery of health care. While DCEs have been applied in a number of healthcare settings and potentially offer useful information to aid decision making, methodological issues should continue to be addressed. Important areas of future research relate to experimental design, alternative methods of data collection and analysis, and investigation of the underlying axioms of economic theory. Collaborative work with psychologists and qualitative researchers will prove useful when investigating these issues. (Ryan, 2001).

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