intraoperative death. With increasing public scrutiny of doctors' decisions, guidelines about working after an intraoperative death may serve to protect doctors as well as patients.

The difficult question of whether surgeons should continue to operate in the immediate aftermath of intraoperative death is a clinical governance issue. We believe that clinical governance should be as evidence based as the medicine it seeks to govern.

We are grateful to all the consultant surgeons at Papworth Hospital who allowed us to study data on their patients.

Contributors: See bmj.com

Funding: None.

Competing interests: None declared.

Ethical approval: Not required.

1 Smith IC, Jones MW. Surgeons' attitudes to intraoperative death: questionnaire survey. *BMJ* 2001;322:896-7.
2 Briffa N. Surgeons' attitudes to intraoperative death. Cardiac surgeons might have different attitudes. *BMJ* 2001;323:341-2.
3 Seinfert BC. Anaesthetic departments need action plans to deal with such catastrophes. *BMJ* 2001;323:341-2.
4 *National adult cardiac surgical database 1998.* London: Society of Cardiothoracic Surgeons of Great Britain and Ireland, May 1999.
5 Parsonnet V, Dean D, Bernstein AD. A method of uniform stratification of risk for evaluating the results of surgery in acquired heart disease. *Circulation* 1989;79(suppl I):I3-12.
6 Nashef SAM, Roques F, Michel P, Gauducheau E, Lemeshow S, Salamon R and the EuroSCORE study group. European system for cardiac operative risk evaluation (EuroSCORE). *Eur J Cardiothorac Surg* 1999;16:9-13.
7 White SM. Death on the table. *Anaesthesia* 2003;58:515-9.

(Accepted 3 December 2003)

doi 10.1136/bmj.37985.371343.EE

Patients' preferences for the management of non-metastatic prostate cancer: discrete choice experiment

Mark Sculpher, Stirling Bryan, Pat Fry, Patricia de Winter, Heather Payne, Mark Emberton

Editorial by Ryan

Centre for Health Economics, University of York, Heslington, York YO10 5DD
Mark Sculpher *professor*

Health Economics Facility, Health Services Management Centre, University of Birmingham, Birmingham B15 2RT
Stirling Bryan *professor*

Institute of Urology, Royal Free and University College Medical School, London W1P 7PN
Pat Fry *research fellow*
Patricia de Winter *research nurse*
Mark Emberton *senior lecturer*

Meyerstein Institute of Oncology, Middlesex Hospital, London W1T 3AA
Heather Payne *consultant in clinical oncology*

Correspondence: M Sculpher mjs23@york.ac.uk

BMJ 2004;328:382–4

Abstract

Objective To establish which attributes of conservative treatments for prostate cancer are most important to men.
Design Discrete choice experiment.
Setting Two London hospitals.
Participants 129 men with non-metastatic prostate cancer, mean age 70 years; 69 of 118 (58%) with T stage 1 or 2 cancer at diagnosis.
Main outcome measures Men's preferences for, and trade-offs between, the attributes of diarrhoea, hot flushes, ability to maintain an erection, breast swelling or tenderness, physical energy, sex drive, life expectancy, and out of pocket expenses.
Results The men's responses to changes in attributes were all statistically significant. When asked to assume a starting life expectancy of five years, the men were willing to make trade-offs between life expectancy and side effects. On average, they were most willing to give up life expectancy to avoid limitations in physical energy (mean three months) and least willing to trade life expectancy to avoid hot flushes (mean 0.6 months to move from a moderate to mild level or from mild to none).
Conclusions Men with prostate cancer are willing to participate in a relatively complex exercise that weighs up the advantages and disadvantages of various conservative treatments for their condition. They were willing to trade off some life expectancy to be relieved of the burden of troublesome side effects such as limitations in physical energy.

Introduction

Several situations exist where patients face trade-offs between the risks and benefits of alternative therapies.[1] The conservative management of men with organ confined or locally advanced prostate cancer is such a situation. Treatment options include watchful waiting or oral steroidal or non-steroidal antiandrogen monotherapy.[2] Many patients choose castration, performed medically rather than surgically. Alternatively, there is the option of antiandrogen treatment combined with medical or surgical castration.

To make an informed choice, men need to weigh up the slight differences in effectiveness of treatments against their side effects. For example, non-steroidal antiandrogen monotherapy offers potential advantages over castration for impotence, loss of libido, and hot flushes, but these may be achieved at the cost of an increased risk of gynaecomastia and breast pain.[3]

Individuals' preferences for alternative treatments need to be considered in the light of the attributes of the treatments. Discrete choice experimentation identifies the key characteristics of alternative treatments and selects a series of levels for each (for example, absent, mild, moderate). Respondents choose from several options, each of which details a series of attributes at different levels. The relative importance of attributes to individuals, and the trade-offs made between them, can be assessed by changing the levels of the attributes and asking participants to make their choice again. We used discrete choice experimentation to elicit treatment related preferences in a sample of men with non-metastatic prostate cancer.

Methods

Pilot study

We conducted a two phase pilot study. In the first phase, 14 men were interviewed by a research nurse. On the basis of these interviews eight attributes were

Treatment attributes and levels and probit models are on bmj.com

This is the abridged version of an article that was posted on bmj.com on 29 January 2004: http://bmj.com/cgi/doi/10.1136/bmj.37972.497234.44

selected for the main study: diarrhoea, hot flushes, ability to maintain an erection, breast swelling or tenderness, physical energy, sex drive, life expectancy, and out of pocket expenses. In the second phase, nine men were asked to complete a questionnaire based discrete choice experiment with these attributes; there was also a brief unstructured interview with a research nurse. Several men needed guidance from the research nurse to complete the exercise, so we used an interview format for the main study.

Study format

The attributes and levels used in the exercise are described on bmj.com. We chose mild and moderate levels only. The mild level included symptoms that would not interfere with work, study, housework, family, or leisure activities, and the moderate level included symptoms that would.

A research fellow conducted the interviews and collected patients' personal data. The men were presented with two treatment options, each containing a set of attributes at specific levels. The interviewer read out the pair wise options and used show cards as prompts to help the men choose the options they preferred (table 1).

The men had to assume a life expectancy of five years, estimated as the average for the sample considering the mean age (70 years) and clinical stage of disease. The two parts of the exercise each contained eight pair wise options. We prepared eight different versions of the questionnaire, each representing a new experimental design (orthogonal main effects). Each version of the questionnaire presented different levels of the cost attribute to allow a larger number of intervals between cost levels across the survey. Study patients were randomly allocated to one of the questionnaires.

Study sample

Our study sample was patients with non-metastatic prostate cancer who had or had never received anti-androgen therapy; there were no exclusion criteria. Potential participants were identified from hospital medical records and were asked to make an appointment for interview.

Analysis

We took each choice between pair wise options as a specific observation. Hence each respondent provided a maximum of 16 observations. Two separate models were specified, one for each group of attributes (see bmj.com for details of models). We explored the interactions between attributes and patient characteristics (age, prostate specific antigen level, and T stage of cancer at diagnosis).

Results

Between 24 May and 8 September 2000, we invited 180 men to participate in our study. Of these, 129 were interviewed. Participants were similar to those who declined for mean age and T stage at diagnosis. See bmj.com for characteristics of the participants.

Discrete choice experiment

Table 2 shows that the coefficients for the attributes in the first part of the exercise were all statistically significantly different from 0; negative values for libido, maintaining an erection, and physical energy indicate that the more severe the problems, the less likely the patient is to prefer that scenario; negative values for out of pocket expenses indicate that the higher the costs, the less likely the patient is to prefer that scenario. Positive values for life expectancy indicate that the greater the life expectancy the more likely the patient is to prefer that scenario. The only statistically significant interaction was between ability to maintain an erection and age; the positive value indicates that older men were less likely to be influenced by the ability to maintain an erection in choosing their preferred scenario.

Table 3 shows that the coefficients for the attributes in the second part of the exercise were all statistically significantly different from zero; negative values indicate that the more severe the problem the less likely the patient is to prefer that scenario. None of the interaction terms were statistically significantly different from zero.

Table 4 shows how much life expectancy the men were willing to trade off to achieve an improvement by one level in one of the other attributes. For example, men were willing to trade off 1.8 months of life expectancy to change diarrhoea from a moderate to mild level or from mild to absent. Because the levels of

Table 1 Example of show card used in discrete choice experiment

	Option A	Option B
Part 1		
Sex drive or libido	Diminished	Diminished
Ability to get or maintain erection	No problems	No problems
Physical energy	Lacking "pep"	No problems
Treatment cost to you personally	£400	£275
Life expectancy	Option A better by two months	
Part 2		
Diarrhoea	Present, moderate	Absent
Hot flushes	Present but mild	Present but mild
Breast swelling or tenderness	Present	Present
Treatment cost to you personally	None	£150
Life expectancy	Option A better by two months	

Table 2 Results of first part of discrete choice exercise

Variable	Coefficient (95% CI)	SE	P value
Libido	−0.3089 (−0.5719 to −0.0460)	0.1342	0.021
Ability to maintain erection	−0.4243 (−0.5321 to −0.3165)	0.0550	<0.001
Physical energy	−0.7032 (−0.8219 to −0.5845)	0.0606	<0.001
Out of pocket expenses	−0.0007 (−0.0014 to −0.0001)	0.0003	0.017
Life expectancy	0.2336 (0.1707 to 0.2966)	0.0321	<0.001
Interaction between ability to maintain erection and age	0.2184 (0.0934 to 0.3433)	0.0637	0.001
Constant	−0.0541 (−0.1459 to 0.0376)	0.0468	0.248
No of observations	1000; 194.92; P<0.0001*		

*χ^2 test.

Table 3 Results of second part of discrete choice exercise

Variable	Coefficient (95% CI)	SE	P value
Diarrhoea	−0.4193 (−0.5454 to −0.2931)	0.0644	<0.001
Hot flushes	−0.1225 (−0.2162 to −0.0287)	0.0479	0.010
Breast tenderness	−0.4329 (−0.6147 to −0.2512)	0.0927	<0.001
Out of pocket expenses	−0.0016 (−0.0025 to −0.0007)	0.0004	0.001
Life expectancy	0.2329 (0.1827 to 0.2832)	0.0256	<0.001
Constant	0.1278 (0.0262 to 0.2294)	0.0518	0.014
No of observations	992; 164.35; P<0.0001*		

*χ^2 test.

Table 4 Patients' marginal rates of substitution between life expectancy and other attributes

Attribute	Life expectancy willing to forgo (months)	Single level improvement
Diarrhoea	1.8	From moderate to mild or from mild to absent
Hot flushes	0.5	From moderate to mild or from mild to absent
Breast swelling	1.9	From present to absent
Loss of libido	1.3	From present to absent
Problems in maintaining an erection:		
Aged <70 years	1.8	From moderate to mild or from mild to absent
Aged >70 years	0.9	From moderate to mild or from mild to absent
Lack of energy or "pep"	3.0	From present to absent

severity differed between attributes, marginal rates of substitution between attributes should be compared with caution. The most important marginal rates of substitution were for physical energy.

Discussion

Men with prostate cancer are willing to participate in the relatively complex exercise of discrete choice experimentation to weigh up the benefits and risks of various conservative treatments, irrespective of the stage of cancer or whether they had received such treatment. To our knowledge, our study is the first to elicit preferences from patients with prostate cancer using discrete choice experimentation, and provides further evidence that this approach can be applied successfully in health care. A novel feature of our study was the use of two groups of attributes. This allowed the choices to be kept relatively simple (maximum of six attributes), and the inclusion of a common core of two attributes (cost and life expectancy) ensured trade-offs across all attributes.

The men were willing to trade off some life expectancy to be relieved of side effects, assuming a life expectancy of five years (the average in the group) as a starting point. The size of the trade-offs, however, should be treated with caution because men may have indicated different preferences if their actual life expectancy had been presented to them.

The results are averaged across the sample and so there is inevitable variation between the men. Therefore careful assessment of individual patient preferences in a clinical setting is needed.

Our findings could be used by clinicians to help patients choose between conservative treatments; knowing about the preferences of other men with prostate cancer might help patients to clarify their own thoughts. A common therapeutic dilemma is the timing of androgen suppression. Should a patient start therapy early, once progression of prostate cancer has been identified? Benefits might include a slowing down of disease progression and perhaps a reduced likelihood of death related to the cancer. Alternatively, treatment could be deferred for an agreed time. This would avoid the immediate side effects of treatment and possibly reduce the medium to long term adverse effects. This type of trade-off is made by many patients everyday, and discrete choice experimentation could gain some insight into the way patients make this difficult choice.

We thank Rob Sheldon (Accent Marketing and Research) for help with the design and analysis of the study, Wendy Coucill for her work on the pilot study, and the patients.

What is already known on this topic

Various factors need to be considered in making treatment decisions in prostate cancer

Patients' views on which factors of treatment are important to them and how they trade off these factors are under-researched

What this study adds

Men are willing to contemplate trading off life expectancy to be relieved of the burden of side effects such as limitations in physical energy

The preferences of older men are not the same as those of younger men

Contributors: See bmj.com

Competing interests: MS, SB, and ME have been paid as consultants for AstraZeneca.

Ethical approval: Local research ethics committee.

1 Kassirer JP, Pauker SG. The toss-up. *N Engl J Med* 1981;305:1467-9.
2 Adolfson J. The natural history of early prostate cancer and the impact of endocrine treatment. *Eur Urol* 1999;36(suppl 2):3-8.
3 Iverson P, Tyrrell CJ, Kaisary AV, Anderson JB, Baert L, Tammela T, et al. Casodex (bicalutamide) 150-mg monotherapy compared with castration in patients with previously untreated nonmetastatic prostate cancer: results from two multicentre randomised trials at a median follow-up of 4 years. *Urology* 1998;51:389-96.

(Accepted 25 November 2003)

doi 10.1136/bmj.37972.497234.44

Corrections and clarifications

Systematic review of role of bisphosphonates on skeletal morbidity in metastatic cancer

Some labelling was missing from the forest plots in this paper by J R Ross and colleagues (*BMJ* 2003;327:469). The x axis on each graph should have been labelled "log odds ratio."

Thousands of families to sue over retained organs

The National Committee Relating to Organ Retention (NACOR) has asked us to clarify a matter relating to the caption in this news article by Clare Dyer (24 January, p 184). The caption said that NACOR represents many of the families who have been affected by organ retention, implying that it was involved in the litigation referred to in the article. This is not true. NACOR in fact provides practical help, advice, and support to affected families; it does not represent litigants.

When to retract?

We inadvertently published a wrong web reference in this editorial by Richard Smith (*BMJ* 2003;327: 883-4). The twelfth web reference (w12) should be:

Shashok K. Pitfalls of editorial miscommunication. *BMJ* 2003;326:1262-4.

One hundred years ago: Hypnotism in Abyssinia

The editorial staff responsible for checking this filler (reprinted 17 January, p 155) were so gripped by the vividness of this tale from 1904 that they failed to notice a basic spelling error. In the final sentence, the venerable principle should, of course, have read: *Anceps remedium* [not *renedium*] *melites quam nullum.*