

The Patients Preferences Questionnaire for Angina treatment: results and psychometrics from 383 patients in primary care in England

A Bowling,¹ B Reeves,² G Rowe³

¹Department of Primary Care and Population Sciences, University College London, London, UK

²Bristol Heart Institute, University of Bristol, Bristol, UK

³Consumer Science, Institute of Food Research, Norwich, UK

Correspondence to

Professor Ann Bowling, Department of Primary Care and Population Sciences, University College London, Hampstead Campus, Rowland Hill Street, London NW3 2PF, UK; a.bowling@ucl.ac.uk

Accepted 13 April 2009

Published Online First 8 March 2010

ABSTRACT

Objectives To develop a psychometrically valid Patient Preferences Questionnaire for Angina treatment (PPQA).

Setting Seven general practices across England in 2007.

Subjects Convenience sample of 383 patients with diagnosed angina.

Method Postal self-administered questionnaire survey using the full-length PPQA. This comprised 54 items about the three main treatment modalities for angina: medication, angioplasty and coronary artery bypass grafting.

Results The full PPQA was reduced to 18 items, six for each of the three subscales (treatment modalities), by standard psychometric methods. The reduced PPQA was psychometrically sound and valid, although confirmatory factor analyses with a larger sample are required.

Conclusion The PPQA is a potentially useful instrument to help clinicians understand patients' angina treatment preferences.

Treatments for angina range from conservative medical management to more or less invasive revascularisation procedures, with differing profiles of costs, benefits and risks.^{1–4} Despite standards in the UK for the provision of revascularisation,⁵ wide variations continue to be documented. For example, analyses of the Hospital Episode Statistics database of all NHS admissions in England showed that, although revascularisation rates increased dramatically, inequities in access to coronary artery bypass graft (CABG) surgery and percutaneous coronary intervention (angioplasty) existed for women and older people.⁴ However, there is no robust evidence suggesting that women are less likely to benefit from treatment, and some trial evidence has reported good revascularisation outcomes in people aged >75 years compared with outcomes with medical treatment.⁶ The reasons behind treatment allocation are not clear, although common justifications for inequitable treatment of older people include perceived lack of benefit, the belief that treatments for older people represent an inappropriate use of scarce resources and the perception that such patients do not want more invasive treatments.⁷ Elder⁷ argues that the question should not be whether an older person will benefit more or less than a younger person from a specific treatment but whether a patient of any age will benefit more from a specific treatment compared with usual care, at an affordable (ie, cost-effective) price.

It is unknown whether lower rates of cardiac intervention among older people and women reflect differences in cardiac patients' expectations and

responses to illness, or variations in supply.^{8–9} Limited evidence suggests that older patients are as prepared as younger patients to accept invasive cardiovascular treatments where appropriate.^{10–11} There is also only limited evidence on whether women prefer less-invasive approaches than men.^{12–14} Thus, although individual patients may hold different attitudes to treatments, evidence of such differences is sparse.¹⁵ Such information is needed to inform decision-making, particularly when treatment alternatives exist with varying benefit-to-risk profiles.

Eliciting patients' preferences for treatment/health care is fraught with methodological challenges. Methods are not standardised: investigators use a wide range of approaches, from utility measures (eg, standard gambles, discrete choice experiments) to single-item questions about preferences. Moreover, neither the information given to patients before eliciting a choice nor the methods of presentation have been standardised. Most publications of randomised controlled trials with patient preference arms do not even specify how patients' treatment preferences were measured.¹⁶ The clinical and health literature on patients' preferences is also conceptually limited and devoid of sociopsychological theory.

AIMS AND METHODS

The aim of this research was to assess the psychometric properties of a new Patient Preferences Questionnaire for Angina treatment (PPQA), establishing its reliability and validity.

DEVELOPMENT OF THE QUESTIONNAIRE

Conceptual work to identify specific domains of treatment preferences is underdeveloped; thus, no conceptual model existed to inform the development of a questionnaire on patients' preferences for treatment for angina (a preference being defined as *a choice made after informed deliberation*). A questionnaire was therefore developed based on research with patients with angina in primary care settings; this research used repertory grid analysis, which elicited patients' underlying attitudes towards each treatment choice.^{17–18} This research indicated a wide range of underpinning attitudes, related to perceived risks, side effects, benefits, effectiveness, fears, confidence, significant others' experiences, aesthetics and convenience. The resulting preferences questionnaire aimed to incorporate each of these "constructs" within three treatment domains for angina: medication, angioplasty, CABG surgery.

Box 1 Original, full-length patients preferences questionnaire (*bold items form the final three subscales*)

Medication items (n = 16):

1. Medication would be good to control symptoms
- 4. The side effects of medication are worse than those from angioplasty**
5. I prefer medication as it's easy even if it's less effective than surgery
- 8. Having to carry medication when outside the home would be troublesome**
10. I'm constantly afraid of forgetting my medication
- 16. With medication, the side effects are often worse than the condition**
21. I like to be in control of my own medication
26. Taking medication would be a real hassle
31. Medication doesn't really solve the problem
- 37. Organising regular prescriptions with any medication can be a nuisance**
38. Medication is not usually very risky
41. It's easy to get used to most medication
- 44. The side effects of medication are worse than those from surgery**
- 48. Most medication is very difficult to understand**
50. I prefer medication even if it is less effective than angioplasty
54. Medication would help me to lead an active life

Surgery items (n = 19):

- 2. Surgery would prolong my life**
6. Surgery would improve my ability to do the things I'd like to do
7. I'd put off having surgery
9. Once you've had surgery there's no going back
11. I'm too old to have surgery
13. The pain of surgery would not put me off having it
14. Scars from surgery would not bother me
15. I am frightened of surgery
18. Surgery would improve my well-being
19. Surgery gives the best chance of cure
23. I hate the idea of being cut open
- 30. Overall surgery is a good thing**
34. I would only consider surgery if my condition worsened
- 36. The balance of risks and benefits of surgery seem better than the risks and benefits of medication**
- 43. Surgery gets the treatment over with quickly**
- 46. I'd have surgery if I could avoid being a burden on others in the long term**
- 47. People who have surgery seem to do well**
49. Surgery is a last resort
53. Having a general anaesthetic is just too risky

Angioplasty items (n = 14):

3. Once you've had angioplasty there's no going back
12. Angioplasty would improve my well-being
17. I would only consider angioplasty if my condition worsened
20. Angioplasty would improve my ability to do the things I'd like to do
24. Angioplasty gives you the best chances of a cure
- 25. Overall, angioplasty is a good thing**
27. Angioplasty gets the treatment over with quickly
- 28. The balance of risks and benefits of angioplasty seem better than the risks and benefits of medication**
29. I'm frightened of angioplasty
- 32. People who have angioplasty seem to do well**
- 39. Angioplasty is a last resort**
- 45. I'm too old to have angioplasty**
51. Angioplasty would prolong my life
- 52. I'd put off having angioplasty**

This resulted in 49 attitude statements, which make up the full-length PPOA, each measured with five-point Likert scales (*strongly agree to strongly disagree*). The attitude items included ones about treatment for angina with medication (16 items), CAGB (19), angioplasty (14) and five general items. The

instrument was initially tested on a convenience sample of cardiac inpatients^{11 19} (see Box 1).

A patient information booklet described the risks and benefits of *four* angina treatments (medication to prevent symptoms recurring, medication to prevent symptoms *and* reduce heart

Table 1 Subscale distributions

Subscale scores	Medication % (n)	Angioplasty % (n)	CABG surgery % (n)
<10 positive	3 (11)	3 (12)	4 (17)
10	3 (11)	2 (9)	4 (13)
11	6 (20)	4 (13)	6 (19)
12	14 (46)	10 (33)	5 (18)
13	12 (40)	4 (16)	13 (42)
14	14 (45)	9 (31)	8 (26)
15	9 (28)	9 (32)	9 (28)
16	10 (31)	8 (27)	12 (38)
17	7 (23)	10 (33)	15 (48)
18	7 (22)	13 (44)	12 (40)
19	5 (17)	5 (18)	5 (17)
20	5 (17)	8 (26)	4 (14)
21	1 (2)	6 (21)	1 (4)
22+ negative	4 (14)	9 (14)	2 (7)
Range (6–30)	6–27	6–24	6–23
Mean (SD)	14.85 (3.46)	15.96 (3.58)	15.12 (3.36)
No. of respondents	327	329	331

CABG, coronary artery bypass graft.

attack risk, angioplasty, and CABG) and the implications of no treatment. The booklet was based on British Heart Foundation literature and information from collaborating cardiologists and surgeons. Patients were instructed to read the information sheet and the booklet before ranking the four treatments in order of preference, and then completing the attitude statements. Core items from the Coronary Revascularisation Outcome Questionnaire (CROQ)²⁰ were used to measure the impact of angina on the patient's life. Other questions measured strength of treatment preference, treatment acceptability, preferred mode of decision-making²¹ and sociodemographic characteristics.

The sample

The Medical Research Council General Practice Research Framework has a network of research general practices across Britain, representing approximately 1% of the British population. The target sample, recruited from this, was adult patients with angina. Patients were identified by the participating practice staff using computer searches of their prescribing records to select all patients (aged 18+) currently prescribed medication for angina (nitrate or glyceryl trinitrate spray/tablets/patch, etc) plus a β -blocker, calcium channel blocker, aspirin or clopidogrel (excluding patients *only* taking the latter). Exclusion criteria were patients who had undergone angiography, CABG or PTCA, patients who were already "flagged" as not wishing to be

contacted about research, and those whom doctors decided it would be inappropriate to approach. Patients were sent a personally addressed letter signed by their doctors inviting them to complete the questionnaire, a consent form, the information leaflet, a booklet about the study and reply-paid envelope to return the questionnaire and the consent form to the research team.

The Medical Research Council General Practice Research Framework approached 97 general practices, of which 15 expressed interest, 24 declined and 58 failed to respond. Seven practices finally undertook patient identification, covering County Durham (1 practice), Cleveland (1), Kent (2), Cornwall (1) and Devon (2). They provided a list of 708 patients, of whom 383 (54%) responded. The number of reminders was limited to one by the research ethics committee that approved the study.

Analysis/item selection

Rigorous scientific procedures of psychometric testing were adopted to assess item redundancy, scaling, reliability, validity and factor structure of the PPOA.^{22–25} Additional analyses (frequency distributions, means, χ^2 tests) examined the associations between preferences scale scores and patients' sociodemographic and health status characteristics.

RESULTS

Response

Of 708 questionnaires mailed, 383 (54%) were returned completed after one reminder and 25 (4%) were returned blank (14 gave no reason, 2 denied having angina, 5 declined to participate, 3 stated the person had died, 1 stated the person had Alzheimer's disease). In addition, two patients telephoned saying they did not have angina (refuting their doctors' diagnosis). Of those responding, almost half were aged 75+ (48%), 41% were female and most (99%) were white. Twenty-seven per cent claimed their angina had caused them trouble in the past 4 weeks ("some", "quite a lot", "a lot").

Scaling acceptability and reliability (homogeneity)

Item response rate was 90–94%, except for two items with non-response of more than 10%, which were eliminated (items 9 and 12: see Box 1). Item endorsement did not exceed 80% for any item, only for combinations of categories (eg, "strongly agree" plus "agree"). Item means should be close to the midpoint (2.5 on five-point scales); thus, items <1.25 and >3.75 should be removed. All item means were in an acceptable range. With the skewness statistic, 0 represents a perfectly normal distribution, although it is rarely achieved with patient-based questionnaires. The skew thus judged as acceptable for all items (± 1.00).

Table 2a Medication items: item–item correlations (homogeneity)

Medication items	4	8	16	37	44	48
4. "The side effects of medication are worse than those from angioplasty"	–	0.210	0.420	0.215	0.515	0.224
8. "Having to carry medication when outside the home would be troublesome"	0.210	–	0.413	0.414	0.211	0.311
16. "With medication, the side effects are often worse than the condition"	0.420	0.413	–	0.311	0.516	0.318
37. "Organising regular prescriptions with any medication can be a nuisance"	0.215	0.414	0.311	–	0.211	0.411
44. "The side effects of medication are worse than those from surgery"	0.515	0.211	0.516	0.211	–	0.210
48. "Most medication is very difficult to understand"	0.224	0.311	0.318	0.411	0.210	–

Table 2b Angioplasty items: item–item correlations (homogeneity)

Angioplasty items	25	28	32	39	45	52
25. "Overall, angioplasty is a good thing"	–	0.525	0.570	0.221	0.333	0.430
28. "The balance of risks and benefits of angioplasty seem better than the risks and benefits of medication"	0.525	–	0.423	0.210	0.322	0.318
32. "People who have angioplasty seem to do well"	0.570	0.423	–	0.210	0.334	0.410
39. "Angioplasty is a last resort"	0.221	0.210	0.210	–	0.420	0.422
45. "I'm too old to have angioplasty"	0.333	0.322	0.334	0.420	–	0.612
52. "I'd put off having angioplasty"	0.430	0.318	0.410	0.422	0.612	–

Item–item correlations were used to eliminate items on grounds of redundancy or non-homogeneity. No item–item correlation exceeded the threshold of >0.70 . Six of the medication items, nine of the surgical items and four of the angioplasty items had weak correlations with three or more other items and were eliminated. In addition, items were dropped if their correlations with the total scale score were ≤ 0.20 .^{25–27} They were also eliminated depending on their influence on Cronbach's α for the scale (by removing each item in turn).

Consideration of all these criteria for scaling and homogeneity resulted in the items shown in bold in Box 1 being selected for inclusion in three 6-item subscales (medication, angioplasty, CABG surgery). All negatively worded items were reverse-coded before Cronbach's α was calculated (as varying directions in the coding can influence the result) and before summing to form the subscale scores (low scores=most positive preferences; high scores=most negative preferences). Table 1 shows the final subscale score distributions. Attitudes were most negative towards the two more invasive treatments, angioplasty and CABG surgery. The subscale shows that 41% of respondents scored ≥ 18 (mid-point of the scale) for angioplasty compared with 39% for CABG and 22% for medication.

Tables 2a–c show that thresholds for inclusion were met for item–item and item–total correlations, means, Cronbach's α 's and skew for the retained items.

The final subscales achieved acceptable Cronbach's α 's >0.70 (table 3). All subscale–total correlations were statistically significant (Spearman's rank order: angiography–total: 0.806, $p<0.01$; CABG–total: 0.689, $p<0.01$; medication–total: 0.335, $p<0.01$). Items correlated more highly with their own subscales than with the other two subscales, confirming their homogeneity as well as their convergent and discriminant validity. Item–item correlations for each subscale are shown in table 3.

Test–retest correlations at 4 weeks for all subscale items with a small volunteer subsample ($n=10$) ranged between Spearman's r of 0.325 and a perfect correlation of 1.00; 11 of the 18 item correlations were >0.50 .

Table 2c Surgery items: item–item correlations (homogeneity)

Surgery items	2	30	36	43	46	47
2. "Surgery would prolong my life"	–	0.512	0.430	0.440	0.244	0.313
30. "Overall surgery is a good thing"	0.512	–	0.420	0.512	0.410	0.518
36. "The balance of risks and benefits of surgery seem better than the risks and benefits of medication"	0.430	0.420	–	0.450	0.231	0.305
43. "Surgery gets the treatment over with quickly"	0.440	0.512	0.450	–	0.301	0.432
46. "I would have surgery if I could avoid being a burden on others in the long term"	0.244	0.410	0.231	0.301	–	0.311
47. "People who have surgery seem to do well"	0.313	0.518	0.310	0.432	0.311	–

Validity

Table 4 shows that correlations were in the expected directions: respondents who scored worst on the CROQ *symptoms* and *psychosocial functioning* scales were more likely to express preferences for the *most* invasive procedure (CABG) and less likely to express preferences for the *least* invasive treatment (medication). There were no associations with angioplasty (widely considered to be the mid-level procedure with respect to invasiveness) and the CROQ variables.

The subscale–subscale correlations were acceptable, with medication being the weakest (not unexpectedly, as all patients were already taking medication but had not experienced angiography or surgery, and thus might feel positive towards it regardless of their feelings for the other treatments).

The surgery subscale was highly significantly associated with all CROQ subscales except physical functioning, in support of its construct validity: as might be expected, more positive attitudes towards surgery were associated with greater impact of the condition on life. It was not associated with age or sex. The associations with medication were the reverse (only statistically significant for CROQ psychosocial functioning and symptoms), as would also be expected (except for physical functioning, where there was no association). The mid-level invasive treatment subscale (angioplasty) was not significantly associated with the CROQ subscales.

Table 5 adds further support to the construct validity of the subscales as strength of preference and degree of acceptability of each treatment correlated significantly, in the expected directions, with each one.

Exploratory factor analysis was used to explore attitude dimensions underlying the questionnaire, using the criteria that the correlation matrix should reveal many coefficients >0.30 , the Kaiser–Meyer–Olkin Measure of Sampling Adequacy should exceed >0.60 ^{28, 29} and Bartlett's Test of Sphericity should be statistically significant at $p=0.001$ to support the factorability of the correlation matrix (suggesting factor analysis is appropriate).³⁰ Eigenvalues should be >1.0 to support the construct

Table 3 Reliability (homogeneity)

Subscales and items	Corrected item–total correlations for subscale items	Cronbach's α : if item deleted from six-item subscale	Mean/SD (range 5–30 (five-item response categories \times six items per subscale: range of subscale: 6–30))	% floor (positive end scores)	% ceiling (negative end scores)	Skewness (skewness: symmetry of distribution normal = 0)
Medication subscale		Subscale: 0.715	Subscale: 14.853/3.461			0.632
4. "The side effects of medication are worse than those from angioplasty"	0.408	0.688	3.33/0.820	8	3	0.157
8. "Having to carry medication when outside the home would be troublesome"	0.440	0.679	3.79/0.938	18	2	0.981
16. "With medication, the side effects are often worse than the condition"	0.536	0.649	2.50/0.909	11	2	0.415
37. "Organising regular prescriptions with any medication can be a nuisance"	0.447	0.678	3.64/0.998	13	4	0.967
44. "The side effects of medication are worse than those from surgery"	0.448	0.680	3.37/0.712	4	1	0.111
48. "Most medication is very difficult to understand"	0.426	0.684	3.41/1.003	7	5	0.747
Angiography subscale		Subscale: 0.769	Subscale: 15.961/3.578			–0.220
25. "Overall, angioplasty is a good thing"	0.558	0.730	2.29/0.694	12	<1	–0.103
28. "The balance of risks and benefits of angioplasty seem better than the risks and benefits of medication"	0.474	0.744	2.79/0.818	6	1	–0.124
32. "People who have angioplasty seem to do well"	0.509	0.743	2.44/0.617	6	<1	–0.546
39. "Angioplasty is a last resort"	0.413	0.767	2.91/1.048	6	9	–0.100
45. "I'm too old to have angioplasty"	0.578	0.718	3.32/1.081	13	7	–0.349
52. "I'd put off having angioplasty"	0.636	0.699	3.30/0.970	9	3	–0.196
Surgery (CABG) subscale		Subscale: 0.774	Subscale: 15.121/3.357			–0.298
2. "Surgery would prolong my life"	0.534	0.737	2.61/0.903	13	2	–0.100
30. "Overall surgery is a good thing"	0.630	0.713	2.48/0.811	10	1	0.188
36. "The balance of risks and benefits of surgery seem better than the risks and benefits of medication"	0.514	0.712	2.92/0.851	6	2	–0.230
43. "Surgery gets the treatment over with quickly"	0.606	0.718	2.53/0.815	9	1	0.121
46. "I would have surgery if I could avoid being a burden on others in the long term"	0.374	0.780	2.27/0.886	18	1	0.551
47. "People who have surgery seem to do well"	0.493	0.749	2.31/0.666	10	1	–0.278

CABG, coronary artery bypass graft.

Codes were reversed for negative questionnaire items throughout so positive responses=lowest and negative responses=highest scores.

Table 4 Convergent and discriminant validity correlations (Spearman's rank order)

	Medication subscale score	Angioplasty subscale score	Surgery subscale score	Total score of three subscales†
Age	–0.045	–0.024**	–0.108	–0.229**
Sex	–0.090	–0.182**	–0.98	–0.66
CROQ symptoms (seven items) summed score	–0.138*	–0.056	0.084	–0.094
CROQ psychosocial functioning (14 items) summed score	–0.171**	–0.062	0.153*	–0.076
CROQ cognitive functioning (three items) summed score	–0.099	–0.46	0.113*	–0.045
CROQ physical functioning (eight items) summed score	–0.095	–0.105	0.051	–0.106
Medication subscale	–	–0.210*	–0.296**	0.303**
Angiography subscale	–0.210*	–	0.576**	0.809**
Surgery subscale	–0.296**	0.576**	–	0.682**
Total subscale score†	0.303**	0.809**	0.682**	–

CROQ, Coronary Revascularisation Outcome Questionnaire.

* $p < 0.05$ ** $p < 0.01$

†Caution: the instrument was designed as three subscales, not for total summing; thus, the totals are shown for reference only and are instrumental for exploring the underlying factor structure.

Table 5 Validity correlations

	Medication subscale (low scores positive—high scores negative attitudes)	Angiography subscale (low scores positive—high scores negative attitudes)	Surgery subscale (low scores positive—high scores negative attitudes)	Total subscales	Degner decision-making scale (ranked high to low preference for involvement)	Age	Sex
Strength of preference for (very strong—low—not at all strong preference—high)							
Medication to prevent symptoms	0.260**	−0.240**	−0.107	−0.048	−0.046	0.065	−0.008
Medication to prevent symptoms and reduce risk	0.304**	−0.296**	−0.175**	−0.093	−0.057	−0.004	0.009
Angiography	−0.168**	0.570**	0.492**	0.498**	−0.077	−0.128*	−0.082
CABG	−0.192*	0.541**	0.627**	0.504**	−0.129*	−0.173**	−0.146**
Degree of acceptability for (very acceptable low—not at all acceptable high)							
Medication to prevent symptoms	0.258**	−0.166**	−0.069	0.014	−0.123*	0.035	−0.034
Medication to prevent symptoms and reduce risk	0.298**	−0.255**	−0.159**	−0.068	0.080	−0.052	0.002
Angiography	−0.145**	0.573**	0.477**	0.515**	−0.076	0.063	−0.097
CABG	−0.190**	0.555**	0.570**	0.501**	0.060	−0.144**	−0.178**
Degner decision-making scale (ranked high to low preference for involvement in decision-making)	0.015	−0.720	0.134*	−0.068	—	−0.043	−0.027

CABG, coronary artery bypass graft.

*p<0.05

**p<0.01

validity of the scale. Factor analysis of the 18 items that make up the three subscales produced four factors accounting for 57% of the total variation between patients. Factor 1 comprised mainly CABG surgery items, component 2 comprised mainly angioplasty items and components 3 and 4 comprised mainly, but overlapping, medication items.

DISCUSSION

The PPOA was shown to be reliable and valid with our sample, although its factor structure requires further confirmation with a larger representative sample of patients with cardiovascular disease in primary and secondary care. The analyses strongly support the psychometric properties of the angioplasty and surgery preference subscales, whereas medication was the weakest. This is unsurprising as medication can be popular because of its low invasiveness and does not exclude positive attitudes towards more invasive treatments.

The preference subscales showed that attitudes were most negative towards the two more invasive treatments: angioplasty and CABG surgery. More positive attitudes towards CABG surgery, and more negative attitudes towards medication, were associated with greater impact of the condition on life. The CABG subscale (although not the others) was highly significantly associated with greater severity of disease on all CROQ subscales except ADL, in support of its construct validity.

The UK NHS modernisation plan included setting up the Expert Patients' Programme, which aimed to involve people more in their health care, increasing patient choice. Development of knowledge on patients' preferences for treatment could inform policy and shared decision-making between patients and doctors, empower patients, strengthen patient choice and thereby patients' adherence to treatment, with implications for treatment effectiveness. The increasing use of evidence-based medicine has been described as marking a paradigm shift in clinical practice.³¹ Patient-centred medicine has similarly been described as a "Copernican Revolution".^{32,33} The development of the PPOA contributes to the growing body of evidence-based patient

choice, by providing an instrument through which patients' relative preferences for treatments can be established, along with indicators of their rationales for choice.

Acknowledgements We would like to thank staff at the Medical Research Council General Practice Research Framework for facilitating the study and recruiting the practices, and the practice staff who sampled the patients and despatched our questionnaire packs and reminders. AB would like to thank Professor Paul Dieppe, formerly director of MRC HSRC, for funding her time for managing, analysing and writing up the study, and Ms Corinne Ward for managing the questionnaire mailing, and reminders, with the practices, checking in replies, coding, data entry and management on SPSS. Ethical consent for the study was given by London MREC, and the R&D and Clinical Governance sections of the PCTs within each practice area.

Funding Medical Research Council Health Services Research Collaboration.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

1. Cheng DC, Bainbridge D, Martin JE, *et al*. The Evidence-based Perioperative Outcomes Research Group. Does off-pump coronary artery bypass reduce mortality, morbidity, and resource utilization when compared with conventional coronary artery bypass? A meta-analysis of randomized trials. *Anesthesiology* 2005;**102**:188–203.
2. Sculpher M, Smith D, Clayton T, *et al*. Coronary angioplasty versus medical therapy for angina. Health service costs based on the second Randomized Intervention Treatment of Angina (RITA-2) trial. *Eur Heart J* 2002;**23**:1291.
3. Sudlow CL, Lonn E, Pignone M, *et al*. Secondary prevention of ischaemic cardiac events. In: Godlee F, ed. *Clinical evidence*. London: BMJ Publishing Group, 2000: 83–113.
4. Shaw M, Maxwell R, Rees K, *et al*. Gender and age inequity in the provision of coronary revascularisation in England in the 1990s: is it getting better? *Soc Sci Med* 2004;**59**:2499–507.
5. Department of Health. *National service framework for coronary heart disease: modern standards and service models*. London: Department of Health, 2000.
6. TIME Investigators. Trial of invasive versus medical therapy in elderly patients with chronic symptomatic coronary artery disease (TIME): a randomised trial. *Lancet* 2001;**358**:951–7.
7. Elder AT. Which benchmarks for age discrimination in acute coronary syndrome? *Age Ageing* 2005;**34**:4–5.
8. Richards H, McConnachie A, Morrison C, *et al*. Social and gender variation in the prevalence, presentation and general practitioner provisional diagnosis of chest pain. *J Epidemiol Community Health* 2000;**54**:714–8.

9. **Richards HM**, Reid ME, Watt GC. Socioeconomic variations in responses to chest pain: qualitative study. *BMJ* 2002;**324**:1308.
10. **Kennelly C**, Bowling A. Suffering in deference: a focus group study of older cardiac patients' preferences for treatment and perceptions of risk. *Qual Saf Health Care* 2001;**10**:i23–8.
11. **Bowling A**, Culliford L, Smith D, *et al*. What do patients really want? Patients' preferences for treatment for angina. *Health Expect* 2008;**11**:137–47.
12. **Chaturvedi N**, Rai H, Ben-Shlomo Y. Lay diagnosis and health-care seeking behaviour for chest pain in south Asians and Europeans. *Lancet* 1997;**350**:1578–83.
13. **Philpott S**, Boynton PM, Feder G. Gender differences in descriptions of angina symptoms and health problems immediately prior to angiography: the ACRE study. *Soc Sci Med* 2001;**52**:1565–75.
14. **Schecter AD**, Goldschmidt-Clermont PJ, McKee G, *et al*. Influence of gender, race, and education on patients' preferences and receipt of cardiac catheterisations among coronary care unit patients. *Am J Cardiol* 1996;**78**:996–1001.
15. **Say RE**, Thomson R. The importance of patient preferences in treatment decisions—challenges for doctors. *BMJ* 2003;**327**:542–5.
16. **King M**, Nazareth I, Lampe F, *et al*. Conceptual framework and systematic review of the effects of participants' and professionals' preferences in randomised controlled trials. *Health Technol Assess* 2005;**9**:1–186.
17. **Lambert N**, Rowe G, Bowling A, *et al*. Reasons underpinning patients' preferences for various angina treatments. *Health Expect* 2004;**6**:246–56.
18. **Rowe G**, Lambert N, Bowling A, *et al*. Ascertaining patients' preferences for treatment for angina using a modified repertory grid method. *Soc Sci Med* 2005;**60**:2585–95.
19. **Bowling A**, Reeves B, Rowe G. Patients' preferences for treatment for angina: An overview of findings from three studies. *J Health Serv Policy* 2008;**13**(13 Suppl):104–8.
20. **Scroter S**, Lamping D. Coronary revascularisation outcome questionnaire (CROC): development and validation of a new, patient based measure of outcome in coronary bypass surgery and angioplasty. *Heart* 2004;**90**:1460–6.
21. **Degner LF**, Sloan JA. Decision making during serious illness. *J Clin Epidemiol* 1995;**45**:941–50.
22. **Crocker L**, Algina J. *Introduction to classical and modern test theory*. Orlando: Harcourt Brace Jovanovich College Publishers, 1986.
23. **Nunnally JC**, Bernstein IH. *Psychometric theory*. New York: McGraw Hill, 1994.
24. **Rust J**, Golombok S. *Modern psychometrics. The science of psychological assessment*. 2nd edn. London: Routledge, 1999.
25. **Streiner DL**, Norman GR. *Health measurement scales. A practical guide to their development and use*. Oxford: Oxford University Press, 2003.
26. **Kline P**. *A handbook of test construction*. London: Methuen, 1986.
27. **Havlicek LL**, Peterson NL. Effect of the violation of assumptions upon significance levels of the Pearson r . *Psychol Bull* 1977;**84**:373–7.
28. **Kaiser H**. A second generation Little Jiffy. *Psychometrika* 1970;**35**:401–15.
29. **Kaiser H**. An index of factorial simplicity. *Psychometrika* 1974;**39**:31–6.
30. **Bartlett MS**. A note on the multiplying factors for various chi square approximations. *J Roy Statist Soc* 1954;**16**:296–8.
31. **Evidence-Based Medicine Working Group**. Evidence based medicine; a new approach to teaching the practice of medicine. *J Am Med Assoc* 1992;**268**:2420–5.
32. **Battista R**. Practice guidelines for preventive care: the Canadian experience. *Br J Gen Pract* 1993;**43**:301–4.
33. **Parker M**. The ethics of evidence-based patient choice. *Health Expect* 2001;**4**:87–91.